Bachelor of Computer Applications

Programme Scheme and Scheme of Examinations
(For students admitted in 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	Contact 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	21CAU01	Programming in C	4	3	50	50	100	4
III	Core:II Practical:I	21CAU02	Programming in C - Practical	3	3	50	50	100	2
III	Core: III	21CAU03	Digital Computer Fundamentals	4	3	50	50	100	4
III	Core: IV Allied: I	21CAU04	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	21CAU05	Programming in Java	5	3	50	50	100	5
III	Core : VI Practical:II	21CAU06	Programming in Java - Practical	4	3	50	50	100	2
III	Core : VII	22CAU07	Office Automation	2	3	50	50	100	1
III	Core : VIII Allied : II	21CAU08	Discrete Mathematics	5	3	50	50	100	3
IV	Foundation : II	21FCU02	Yoga and Ethics	2	3	-	50	50	2
			TOTAL	**30**				**650**	**21**

SEMESTER-III									
III	Core :IX	21CAU09	Data Structures	6	3	50	50	100	6
III	Core : X	21CAU10	Open Source Technology	5	3	50	50	100	5
III	Core : XI Practical:III	21CAU11	Open Source Technology - Practical	5	3	50	50	100	3
III	Core : XII	21CAU12	System Software	6	3	50	50	100	5
III	Core: XIII Allied : III	21CAU13	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	21CAU14	Relational Database Management Systems	6	3	50	50	100	6
III	Core : XV Practical:IV	21CAU15	SQL and PL/SQL- Practical	6	3	50	50	100	3
III	Core : XVI	21CAU16	Operating System	6	3	50	50	100	4
III	Core : XVII Allied : IV	21CAU17	Business Accounting	5	3	50	50	100	3
IV	Skill Enhancement: I Practical:V	21SECAU01	Programming in Tally - 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**

SEMESTER-V									
III	Core : XVIII	21CAU18	Programming in Python	6	3	50	50	100	6
III	Core : XIX Practical:VI	21CAU19	Programming in Python - Practical	6	3	50	50	100	3
III	Core : XX	21CAU20	Computer Graphics	6	3	50	50	100	4
III	Core : XXI	21CAU21	Mini Project	-	3	100	-	100	1
III	Core: XXII Elective: I	21CAU22A/ 21CAU22B/ 21CAU22C	Data Mining / Introduction to Compiler Design/ Internet of Things	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	21PECAU01	Case Tools (Self Study)	-	3	-	100	100	2
			TOTAL	**30**				**750**	**23**
SEMESTER-VI									
III	Core: XXIV	21CAU24	Mobile Computing	6	3	50	50	100	6
III	Core:XXV	21CAU25	Programming in VB.Net	6	3	50	50	100	5
III	Core:XXVI Practical:VII	21CAU26	Programming in VB.Net - Practical	6	3	50	50	100	3
III	Core: XXVII Elective: II	21CAU27A/ 21CAU27B/ 21CAU27C	Network Security / Big Data Analytics / Web Services	5	3	50	50	100	4
III	Core: XXVIII Elective: III	21CAU28A/ 21CAU28B/ 21CAU28C	Informatics/ Green Computing/ Artificial Intelligence	5	3	50	50	100	4
IV	Skill Enhancement: III	21SECAU03	Software Testing	2	3	50	-	50	2
			TOTAL	**30**				**550**	**24**
V	Competency Enhancement		NSS/YRC/RRC/CCC/PHY.EDU/ 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.

Syllabus

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: I	21CAU01	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	Analyse the functions of Pointers, Structures and files	K4
CO5	Determine the usage of pointers and files	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**1**	**1**
CO2	**9**	**9**	**9**	**9**	**9**	**1**	**1**
CO3	**9**	**9**	**9**	**9**	**9**	**3**	**1**
CO4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**3.72**	**1.27**	**1.16**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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 REFERENCES:

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	21CAU02	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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**3**	**9**	**9**	**3**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**3**	**9**
CO4	**9**	**9**	**9**	**9**	**9**	**3**	**9**
CO5	**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	**2.61**	**2.75**	**2.38**	**2.95**	**4.30**	**1.36**	**5.01**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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	21CAU03	DIGITAL COMPUTER FUNDAMENTALS	48	4

Contact hours per week: 4

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

Preamble

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

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic computer components and micro-operations	K1
CO2	Explain number conversions, Boolean algebra and logic circuits	K2
CO3	Utilize the components of register, input/output and Flip flops	K3
CO4	Analyze the Boolean expressions using Boolean algebra	K4
CO5	Evaluate the storage concepts using digital logic	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO4	**9**	**9**	**3**	**3**	**3**	**3**	**1**
CO5	**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	**2.61**	**2.75**	**2.01**	**2.17**	**2.58**	**2.26**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT I **Number System and Logic gates** **(8Hours)**

Number System and Binary Codes: Decimal- Binary- Octal- Hexadecimal – Binary Addition- Multiplication- Division- Complements- Floating point representation- BCD- Excess3- Gray Code. Digital Logic: The Basic Gates – NOR, NAND, XOR Gates.

UNIT II **Boolean Algebra** **(10 Hours)**

Boolean Algebra – Karnaugh Map – Canonical Form 1 – Construction and Properties – Don't Care Combinations - Product of Sum, Sum of Products, Minimization in SOP using Karnaugh Map- Minimization in POS using Karnaugh Map.

UNIT III **Combinational Circuits** **(10 Hours)**

Arithmetic and logic combinational circuits: Half adder – Full adder- Half subtractor- Full subtractor-Data handling combinational circuits: Multiplexers – Demultiplexers – Decoder-Encoder.

UNIT IV **Sequential Circuits** **(10 Hours)**

Flip flops: RS, JK, D, and T Flip-Flops – Master-Slave JK Flip-Flops. Registers: Shift Registers – Shift-left Register-Shift-right Register

UNIT V **Counters** **(10 Hours)**

Counters: Asynchronous counter - Synchronous Counter-Ring counter-Synchronous Up/Down Counter. Memory Unit-Read only Memories-Random access Memories-Cache Memory

TEXT BOOKS:

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

REFERENCE BOOK:

1. Thomas C. Bartee, Digital Computer Fundamentals, TMH

WEB REFERENCES:

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
I	**I**	**-**	**50**	**50**

Preamble

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioural 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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO2	**9**	**9**	**9**	**9**	**3**	**1**	**3**
CO3	**9**	**9**	**9**	**9**	**1**	**1**	**3**
CO4	**9**	**9**	**9**	**9**	**1**	**1**	**3**
CO5	**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	**2.61**	**2.75**	**2.38**	**2.56**	**0.86**	**0.63**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;9- High correlation between COs and POs

COURSE CONTENT

Unit I (4 Hours)

Multidisciplinary Nature of Environmental Studies

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

Unit II (5 Hours)

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

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

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

Unit III (5 Hours)

Biodiversity and its Conservation-Introduction – Definition – Genetic, Species and Ecosystem Diversity, Bio geographical Classification of India -Value of Biodiversity – Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Value- Biodiversity at Global, National and Local Levels- India as a Mega-Diversity Nation- Hot-Spots of Biodiversity- Threats to Biodiversity – Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts- Endangered and Endemic Species of India Conservation of Biodiversity – In-situ and Ex-situ and Conservation of Biodiversity.

Unit IV (5 Hours)

Environmental Pollution: Definition, Causes, Effects, control measures and Prevention Acts for Air, Water, Soil, Noise, Thermal Pollutions and Nuclear Hazards. **Solid Waste Management**: Meaning, Causes, effects and control measures of urban and industrial wastes. **Disaster Management**: Meaning, Types of Disasters: floods, earthquake, cyclone and landslides. **Environmental Ethics:** Issues and possible solutions- Climate change, global

warming, acid rain, ozone layer depletion, nuclear - accidents and holocaust. Consumerism and waste products, Public Awareness.

Unit V **(5 Hours)**

Social Issues and the Environment: 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	21CAU05	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	Apply java programming 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 – Analyze;K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POS / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**9**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**3.15**	**2.99**	**5.01**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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 (10 Hours)

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,Programming with 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	21CAU06	PROGRAMMING IN JAVA-PRACTICAL	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 tokens, control structures and looping, arrays, applet programming and Exception handling	K2
CO3	Apply java programming 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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**3**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**9**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.56**	**3.15**	**2.99**	**5.01**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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	21CAU07	OFFICE AUTOMATION	24	1

Contact hours per week: 2

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

Preamble

To enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Utilize the basics options of MS-Word in preparation of documents	K1
CO2	Demonstrate the concepts in MS-Word such as Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.	K2
CO3	Apply the various accounting features in MS-Excel, Accessing, overview of toolbars, Saving excel files, Using help and Resources.	K3
CO4	Analyze the importance of MS-Excel such as Spreadsheet tool	K4
CO5	Assess MS-Powerpoint layouts and presentations	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**15**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**1.36**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

PRACTICAL LIST

Microsoft Word:

1. **Using word to create project certificate**. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.
2. Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
3. Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.
4. Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

Microsoft Excel:

5. Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
6. Calculations - Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP
7. Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting
8. Cricket Score Card - Features to be covered:-Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS Power Point

9. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows
10. This session helps students in making their presentations interactive. Topics covered includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

REFERENCE BOOKS:

1. Sanjay Saxena, **"MS Office 2000 for Everyone"**, Vikas Publishing House Pvt Ltd., 2001.
2. Joan Lambert and Curtis Frye, **"Microsoft office 2016 Step by Step",** 2016.

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
I	II	**-**	**50**	**50**

Preamble

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

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	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	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**3**	**1**	**1**	**3**
CO2	**9**	**9**	**9**	**3**	**3**	**1**	**3**
CO3	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO4	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**0.98**	**1.24**	**1.00**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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.Eradication of Worries-Benefits of Blessings- Greatness of Friendship- Individual Peace and World Peace.

Practice: Worksheet**.**

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

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	21CAU09	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 the various data structures, algorithms and sorting methods	K1
CO2	Describe the basic concepts of data structures, sorting and symbol table	K2
CO3	Use 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 – Analyze;K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**27**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**4.30**	**2.44**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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 BOOKS:

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 Algorithns 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	21CAU10	OPEN SOURCE TECHNOLOGY	60	5

Contact hours per week: 5

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

Preamble

To understand the Open SourceTechnology.

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 Open Source Software & Linux	K1
CO2	Demonstrate the concepts of Android	K2
CO3	Utilize the syntax of PHP Language	K3
CO4	Analyze an insight on MYSQL Database	K4
CO5	Assess General introduction on Open Source Grid Computing	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**3**	**3**	**9**	**9**	**9**
CO2	**9**	**3**	**9**	**3**	**9**	**9**	**3**
CO3	**9**	**3**	**9**	**3**	**9**	**9**	**3**
CO4	**9**	**3**	**9**	**9**	**9**	**9**	**3**
CO5	**9**	**3**	**9**	**9**	**9**	**3**	**1**
Total Contribution of COs to POs	**45**	**21**	**39**	**27**	**45**	**39**	**19**
Weighted Percentage of COs Contribution to POs	**2.61**	**1.28**	**2.38**	**1.77**	**4.30**	**3.53**	**2.44**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT I Introduction to OSS & Linux Basics (12 Hours)

Introduction – Need for Open Source Applications – Advantages – Disadvantages – History – Free Software Foundation and Open Source Initiative Presentation – Security and Reliabiliy – Economical Aspects – Applications of Open Source Software. Linux Basics – Introduction – Kernel/User Mode- Process – Advanced Concepts Scheduling

UNITII Android (12 Hours)

Introduction – Open Source Android Platform – History-Android Architecture – Android Versions- Dalvik Virtual Machines - Characteristics –Installing Eclipse ADT Plug-in and Android DSK Packages – Android Virtual Device or Emulator – File System Hierarchy – Android sample apps.

UNIT III PHP Basics (12 Hours)

Introduction – Identifiers, Variables, Constants, Data Types, Operators – Statements, Loops – Advanced PHP – Get and Post Methods – Arrays in PHP –Object Oriented Concepts– Strings–File Handling and Data Storage

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UNIT IV MySQL Database (12 Hours)

Introduction – Setting up an Environment –Starting, Terminating and Writing Your Own SQL Programs – Record Selection Technology – Working with String Functions, Dateand Time – Sorting Query Results – Using Sequences – PHP and MYSQL Database.

UNIT V Open Source Grid Computing &Open Source Cloud (12 Hours)

Introduction – Open Grid Service Architecture – Open Grid Service Infrastructure – Web Service Resource Framework – OGSA Basic Services – Security Issues.Introduction – FOSS Cloud Software Environments – Eucalyptus – Open Nebula – Open Stack.

TEXT BOOK:

1. M.N. Rao, Fundamentals of Open Source software, PHI Learning Private Limited,2015.

REFERENCE BOOK:

1. Dr. Dayanand Ambawade, Dr. Deven Shah & DT Editorial Services, Linux Labs and Open Source Tcchnologiesn,,dreamtech press,2015

WEB REFERENCES:

1. https://www.tutorialspoint.com/operating_system/os_linux.htm
2. https://youtu.be/KitoxUB11go
3. https://www.w3schools.com/php/
4. https://youtu.be/7S_tz1z_5bA
5. https://www.slideshare.net/ShivaramBose/open-source-grid-middleware-packages

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XI Practical:III	21CAU11	OPEN SOURCE TECHNOLOGY - PRACTICAL	60	3

Contact hours per week: 5

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

Preamble

To understand the Open SourceTechnology.

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 Shell script in Linux	K1
CO2	Demonstrate the concepts of Shell script and C program	K2
CO3	Utilize the syntax of PHP Language	K3
CO4	Analyze an insight on forms & cookies	K4
CO5	Assess an insight on MYSQL Database	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

Pos / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**3**	**1**	**9**	**9**	**9**
CO2	**9**	**3**	**9**	**1**	**9**	**9**	**3**
CO3	**9**	**3**	**9**	**3**	**9**	**9**	**3**
CO4	**3**	**3**	**9**	**9**	**9**	**9**	**1**
CO5	**3**	**3**	**9**	**9**	**9**	**9**	**1**
Total Contribution of COs to POs	**33**	**21**	**39**	**23**	**45**	**45**	**17**
Weighted Percentage of COs Contribution to POs	**1.91**	**1.28**	**2.38**	**1.51**	**4.30**	**4.07**	**2.18**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

PRACTICAL LIST

Linux

1. Create a shell script that displays a list of all the files in the current directory
2. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file or directory.
3. Evaluate a shell script that accept a list of file names as arguments count and report the occurrence of each word.
4. Construct a C program to emulate the Unix ls-l command.

PHP & MYSQL

5. Design a simple calculator using PHP
6. Create a PHP Program to demonstrate string functions.
7. Illustrate a PHP program that demonstrate form element(input element)
8. Design a program that demonstrates use of cookies.
9. Create a PHP program to create a database using MySQL.
10. Write a PHP program to create a table in MySQL and insert record into a table using MySQL.
11. Write a PHP program to select data and show into table format.
12. Create a student Registration in PHP and save and Display the student records.

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE : XII	21CAU12	SYSTEM SOFTWARE	72	5

Contact hours per week: 6

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

Preamble

To impart System Software Knowledge at the end of the course

Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Recognize the machine architecture and working process of Assembler, linker, loader, Macro Processor and complier	K1
CO2	Demonstrate the functions of Assembler, Linker, Loader, Macro Processor and Compiler	K2
CO3	Apply the instructions and features of machine architecture	K3
CO4	Categorize the design options with system software process	K4
CO5	validate all the machine operations through system software issues	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**3**	**3**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**3**	**9**	**3**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO5	**9**	**9**	**9**	**9**	**3**	**3**	**1**
Total Contribution of COs to POs	**45**	**45**	**39**	**33**	**33**	**21**	**17**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.38**	**2.17**	**3.15**	**1.90**	**2.18**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

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

System Software and Machine Architecture – The Simplified Instructional Computer (SIC) – SIC Machine Architecture – SIC/XE Machine Architecture- Assemblers: Basic Assembler Functions – Machine – Dependent Assembler Features – Machine – Independent Assembler Features – Assembler Design Options.

UNIT II **Loaders And Linkers** **(14 Hours)**

Basic Loader Functions - Machine – Dependent Loader Features – Machine – Independent Loader Features – Loader Design Options.

UNIT III **Macro Processors** **(14 Hours)**

Basic Macro Processor Functions - Machine – Dependent Macro Processor Features – Machine – Independent Macro Processor Features – Macro Processor Design Options.

UNIT IV **Compilers** **(14 Hours)**

Basic Compiler Functions - Machine – Dependent Compiler Features – Machine – Independent Compiler Features – Compiler Design Options.

UNIT V **Software Engineering Issues** **(15 Hours)**

Text Editors – Interactive Debugging Systems – Introduction to Software Engineering Concepts – Procedural System Design – Object – Oriented System Design

TEXT BOOK:

1. Leland L.Beck, System Software (An Introduction to System Programming), 3rd Edition, Pearson Education

REFERENCE BOOK:

1. D. M. Dhamdhere, “Systems Programming and Operating Systems”, Second Revised,Edition, Tata McGraw-Hill, 1999
2. Santanu Chattopadhyay, “System Software”, Prentice-Hall India, 2007
3. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques, and Tools”,2nd Edition, Pearson Education Asia

WEB REFERENCES:

1. https://www.techtarget.com/whatis/definition/system-software
2. https://www.openxcell.com/blog/system-software
3. https://ecomputernotes.com/fundamental/disk-operating-system/system-software
4. https://www.learncomputerscienceonline.com/system-software
5. https://www.britannica.com/technology/system-software

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	Categorize the 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 – Analyze;K5 – Evaluate;

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**2.58**	**1.45**	**2.44**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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 REFERENCES:

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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**0**	**0**	**0**
CO2	**9**	**9**	**9**	**9**	**3**	**0**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO4	**3**	**3**	**3**	**9**	**9**	**9**	**9**
CO5	**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	**1.91**	**2.01**	**1.89**	**2.43**	**2.10**	**2.44**	**3.85**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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** **(5Hours)**

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	21CAU14	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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**9**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**4.30**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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 BOOKS:

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-V:Chapters 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	21CAU15	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 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	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 – Analyze;K5 – Evaluate;

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**9**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**4.30**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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	21CAU16	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 functions of deadlock and storage management	
CO3	Utilize the policies of scheduling	K3
CO4	Analyze memory management and deadlock	K4
CO5	Evaluate the concepts of storage management	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**1**
CO4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**3.15**	**2.99**	**1.41**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XVII ALLIED : IV	21CAU17	BUSINESS ACCOUNTING	**60**	**3**

Contact hours per week: 5

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

Preamble

To impart basic accounting knowledge

Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Recall the important definitions in financial, cost and management accounting	K1
CO2	Explain the concepts of financial, cost and management accounting	K2
CO3	Apply the accounting principles in solving the business problems	K3
CO4	Analyze the accounting standards through different types of accounts	K4
CO5	Evaluate the accounting methods in various problems	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO5	**9**	**9**	**9**	**9**	**3**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**27**	**25**	**17**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.58**	**2.26**	**2.18**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT I **Introduction to Finanacial Accounting** **(10 Hours)**

Financial Accounting - Definition and Scope - Objectives of Financial Accounting- Accounting v/s Book Keeping - Terms used in Accounting - Users of Accounting Information - Limitations of Financial Accounting

UNIT II **Recording of transactions** **(12 Hours)**

Journals - Ledger - Subsidiary Books - Cash Book - Trial Balance

UNIT III **Preparation of Final Accounts** **(15 Hours)**

Trading, Profit and Loss Account and Balance sheet with simple adjustments-Outstanding Expenses and Income, Prepaid Expenses, Pre received Income, Depreciation

UNIT IV **Cost Accounting** **(12 Hours)**

Cost Account-Meaning Elements of Cost-Preparation of Cost Sheet with Simple Adjustments- Material Cost: Stores Ledger-FIFO-LIFO-Weighted Average, Simple Average Method.

UNIT V **Management Accounting** **(12 Hours)**

Management Account-Meaning –Objectives-Management Account with Financial Account, Budget and Budgetary control-Preparation of Various Budgets -Flexible Budget-Cash Budget

TEXT BOOK:

1. T.S Grewal, Double Entry Book Keeping, Sultan Chand & Sons, New Delhi.

REFERENCE BOOKS :

1. Sharma and Gupta, Management Accounting, Kalyani Publishers, New Delhi
2. Anil Chowdhry, Fundamentals Of Accounting & Financial Analysis, (Pearson Education)
3. Jane Reimers, Financial Accounting,(Pearson Education)
4. Rajesh Agarwal & R Srinivasan, Accounting Made Easy, (Tata McGraw –Hill)
5. Amrish Gupta, Financial Accounting For Management, (Pearson Education)
6. Dr. S. N. Maheshwari, Financial Accounting For Management, (Vikas Publishing House)

WEB REFERENCES:

1. https://www.xero.com/us/glossary/business-accounting
2. https://quickbooks.intuit.com/r/bookkeeping/small-business-accounting-checklist-10-things
3. https://www.freshbooks.com/hub/accounting/do-accounting-small-business
4. https://www.zoho.com/books/guides/journals-and-ledgers-in-bookkeeping.html
5. https://www.info.com/serp?q=accounting%20ledger%20books

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-IV	SKILL ENHANCEMENT : I PRACTICAL :V	21SECAU01	PROGRAMMING IN TALLY - PRACTICAL	**48**	**2**

Contact hours per week: 4

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

Preamble

To impart basic accounting knowledge

Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Recall the importance of company creation in Tally	K1
CO2	Explain the concepts of ledgers and voucher details	K2
CO3	Apply the accounting principles in solving the business problems	K3
CO4	Analyze the accounting standards through different types of accounts	K4
CO5	Evaluate the accounting methods in various problems	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO4	**9**	**9**	**9**	**9**	**3**	**1**	**1**
CO5	**9**	**9**	**9**	**9**	**3**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**21**	**17**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.01**	**1.54**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

PRACTICAL LIST

1. Creating a company with all relevant details
2. Create the ledgers under appropriate predefined groups
3. Create vouchers and view profit and loss a/c and balance sheet
4. Create stock items, Stock categories, units of measure view the Stock summary
5. Create purchase and sales vouchers for stock items
6. Create stock vouchers using debit note and credit note.
7. Memo voucher
8. Ratio analysis
9. Prepare trading profit and loss account and b/s, with inventory details
10. Prepare budget using relevant details

CATERGORY	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, and the 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	Analyse the knowledge and skills needed for a career in this field	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**1**	**0**	**1**
CO2	**9**	**9**	**9**	**9**	**1**	**0**	**1**
CO3	**9**	**9**	**9**	**3**	**3**	**1**	**1**
CO4	**9**	**3**	**1**	**1**	**3**	**3**	**3**
CO5	**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	**2.61**	**1.89**	**1.89**	**1.44**	**1.62**	**1.18**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;9- High correlation between COs and POs

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 Behaviour: 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 (8 Hours)

Grievance Redressal Mechanism under the Indian Consumer Protection Law

Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal; Offences and penalties. **Leading Cases decided under Consumer Protection law by Supreme Court/National Commission**: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNITIV 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	21CAU18	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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**27**	**33**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.58**	**2.99**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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	21CAU19	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

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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**27**	**33**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.58**	**2.99**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

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	21CAU20	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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**9**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**3.15**	**2.99**	**5.01**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;9- High correlation between COs and POs

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.

UNITII **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** **(15 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 REFERENCES:

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

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XXI	21CAU21	MINI PROJECT	-	1

Contact hours per week: Nil

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

Preamble

To expose the students to practice themselves and find solutions for the problems in their respective areas

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	Explore the real time applications	K4
CO5	Evaluate demographic variable and factors influencing software development	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO4	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**4.30**	**4.07**	**5.78**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XXII ELECTIVE: I	21CAU22A	DATA MINING	**60**	**4**

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	**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 the 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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO2	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO3	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I **Introduction to Data Mining** **(12 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** **(12 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** **(12 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** **(12 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** **(12 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: XXII ELECTIVE: I	21CAU22B	INTRODUCTION TO COMPILER DESIGN	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**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 the basics of compilers and lexical analysis	K1
CO2	Infer the concepts of syntactic specification of programming languages and parsing techniques	K2
CO3	Apply the syntax and symbol tables in complier design	K3
CO4	Analyze runtime storage and error recovery	K4
CO5	Interpret General introduction on code optimization	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO2	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO3	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I Introduction to Compilers (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: XXII Elective: I	21CAU22C	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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO2	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO3	**9**	**9**	**9**	**9**	**1**	**9**	**1**
CO4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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 REFERENCES:

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-IV	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	Outline the basic concept of the Internet, World Wide Web and Web browsers	K1
CO2	Explain the Knowledge of Finding Information in the Internet and awareness on Internet Security and Privacy	K2
CO3	Apply tips for effective use of Email, Advantages and Disadvantages of Email	K3
CO4	Analyze the Possibilities of Social Networking, Learning discussion forum software & effective use of video conferencing	K4
CO5	Evaluate the learn Blogging & Making Money in the Internet	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO5	**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	**2.26**	**2.01**	**1.65**	**1.12**	**0.96**	**0.63**	**0.64**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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

UNIT IV 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/**

CATE GORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-IV	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 concept of Mobile Computing	K4
CO5	Examine the DBMS Architecture	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO5	**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	**2.26**	**2.01**	**1.65**	**1.12**	**0.96**	**0.63**	**0.64**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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

REFERENCE BOOKS:

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

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-IV	CORE:XXIII OPEN ELECTIVE		MACHINE LEARNING	48	2

Contact hours per week: 4

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

Preamble

To provide an in-depth knowledge about machine learning concepts, techniques, models, and algorithms.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the Machine Learning Fundamentals	K1
CO2	Understanding the Machine Learning Concepts	K2
CO3	Summarize the Impact of Machine Learning Applications	K3
CO4	AnalyzeMachine Learning Support to Business Goals	K4
CO5	Evaluatethe Knowledge of Machine Skills	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO5	**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	**2.26**	**2.01**	**1.65**	**1.12**	**0.96**	**0.63**	**0.64**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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 (9 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 (10 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 REFERENCES:

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 innovation for personal and professional excellence, stress management, time management and conflict management and inculcation of human values.

Course outcome

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 – Analyze; K5 – Evaluate;

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**3**	**9**	**3**	**1**	**3**	**3**	**1**
CO2	**1**	**9**	**3**	**1**	**3**	**9**	**1**
CO3	**1**	**3**	**3**	**3**	**9**	**3**	**3**
CO4	**1**	**3**	**3**	**3**	**9**	**9**	**3**
CO5	**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	**0.41**	**1.65**	**0.91**	**0.59**	**2.58**	**2.26**	**2.18**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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 - .
5. "A Leader Should Know How to Manage Failure" – www.youtube.com/
6. watch?v=laGZaS4sdeU
7. Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review, 85*(6): 60.
8. Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15
9. How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-V	PROFICIENCY ENHANCEMENT	21PECAU01	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 – Analyze; K5 – Evaluate;

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	3	9	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	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	2.61	2.75	2.74	2.95	2.01	2.44	2.70

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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 Booch Methodology – 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	21CAU24	MOBILE COMPUTING	72	6

Contact hours per week: 6

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

Preamble

To learn about different technologies available in the mobile computing.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the emergence of Mobile technology and its architecture	K1
CO2	Identify the features of various technologies	K2
CO3	Apply the knowledge on mobile computing through telephony	K3
CO4	Examine the different Mobile networks	K4
CO5	Determine data services in mobility	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**6**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**6**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**6**	**9**	**9**
CO4	**9**	**9**	**9**	**9**	**6**	**9**	**9**
CO5	**9**	**9**	**9**	**9**	**6**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**30**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.87**	**4.07**	**5.78**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I Introduction to Mobile Computing and its Architecture (15 Hours)
Mobile Computing –Dialogue Control –Networks –Middleware and Gateways –Application and Services-Developing Mobile Computer Applications –Security in Mobile Computing – Mobile Computing Architecture: History of Computers and Internet –Architecture for Mobile Computing –Three-tier Architecture –Design Considerations for Mobile Computing –Mobile Computing through Internet –Making Existing Applications Mobile Enabled.

UNIT II Mobile Computing through Telephony (15 Hours)
Evolution of Telephony – Multiple Access Procedures – Mobile Computing through Telephone – IVR Application – Voice XML – TAPI.

UNIT III Emerging Technologies (15 Hours)
Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 –Java Card. GSM : Global System for Mobile Communications – GSM Architecture – GSM Entities – Call routing in GSM .

UNIT IV GPRS (15 Hours)
GPRS – GPRS and Packet Data Network –GPRS Network Architecture –GPRS Network Operations –Data Services in GPRS –Application for GPRS-Limitations –Billing and Charging.

UNIT V Wireless LAN (12 Hours)
Wireless LAN: Introduction-Wireless LAN Advantages-Wireless LAN Architecture-Mobility in Wireless LAN –Deploying Wireless LAN-Mobile AdhocNetworks and Sensor network-Wireless LAN security.

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

REFERENCE BOOK:
1. Mobile Computing, KumkumGarg, Pearson Education, 2010.

WEB REFERENCES:

1. https://www.slideshare.net/rnpatel/ch1-13878057

2. https://slideplayer.com/slide/4646453/

3. https://www.motherteresawomenuniv.ac.in/dde/SLM/MOBILE%20COMPUTING.pdf

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE : XXV	21CAU25	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	Analyze the various .NET controls and database controls	K4
CO5	Evaluate the use of ADO.Net connection	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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

UNIT IV 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

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE :XXVI Pravtical:VII	21CAU26	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

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	Recall the basic concepts ofclass 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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO5	**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	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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.

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XXVII ELECTIVE: II	21CAU27A	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	Recall the various definitions involved in Symmetric Encryption	K1
CO2	Illustrate various Public key cryptographic techniques	K2
CO3	Experiment with Secure Socket Layer	K3
CO4	Examine authentication applications	K4
CO5	Sketch IP Security and web Security	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO3	**9**	**9**	**9**	**9**	**9**	**3**	**1**
CO4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT 1 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 2 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 3 Authentication Applications (12 Hours)

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

UNIT 4 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 5 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 REFERENCES:

1. https://www.geeksforgeeks.org/osi-security-architecture/
2. https://www.geeksforgeeks.org/digital-signatures-certificates/
3. https://www.tutorialspoint.com/internet_technologies/digital_signature.htm
4. https://www.geeksforgeeks.org/secure-socket-layer-ssl/
5. https://www.youtube.com/watch?v=402-fibaczk

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE:XXVII ELECTIVE:II	21CAU27B	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 definitions in Big Data and Data Analytics	K1
CO2	Explain NoSQL, Hadoop and Map Reduce Concepts with algorithms	K2
CO3	Apply Data Stream Management, Frequent Itemset Mining in clustering techniques	K3
CO4	Analyze Big Data Challenges, link analysis and Recommendation systems	K4
CO5	Evaluate Hadoop architecture and types of Big Data approach	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO3	**9**	**9**	**9**	**9**	**1**	**1**	**1**
CO4	**9**	**9**	**9**	**9**	**1**	**1**	**1**
CO5	**9**	**9**	**9**	**3**	**1**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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 Neighbor Search- Applications of Nearest Neighbor 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 Itemsets- 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 REFERENCES:

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-III	CORE: XXVII ELECTIVE : II	21CAU27C	WEB SERVICES	**60**	**4**

Contact hours per week: 5

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

Preamble

To learn about the web services 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 web services	K1
CO2	Explain web service architecture and its design	K2
CO3	Model the appropriate web service architecture that can be used for real time applications	K3
CO4	Analyze wide range of applications of web services	K4
CO5	Recommend specific web service design for a real time problem	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO3	**9**	**9**	**9**	**9**	**1**	**1**	**1**
CO4	**9**	**9**	**9**	**9**	**1**	**1**	**1**
CO5	**9**	**9**	**9**	**3**	**1**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I Introducing Web Services (12 Hours)

Understanding What Web Services Are - The Great Promise of Web Services - The Key Components - Tools and Vendors - Who Manages the Web Services Specifications - The World Wide Web Consortium - OASIS - WS-I - The Specification Process.

UNIT II Advantages, Disadvantages and Technologies (12 Hours)

Advantages of Web Services: Legacy Systems - Lower Operational Costs - Lower Software Development Cost - Faster System Development - Better Interfaces with Customers - Better Integration with External Business Partners - New Revenue Opportunities - Completely New Business Models. Disadvantages and Pitfalls of Web Services: Pitfalls of Web Services - Performance Issues - Lack of Standards - Newness of Web Service Technology - Staffing Issues Comparing Web Services to Other Technologies: Stub/Skeleton Based Architectures - CORBA - Java RMI - DCOM - HTTP Transactional-based Architectures - CGI - Servlets/JSP - ASP and PHP.

UNIT III Typical Web Services Designs (12 Hours)

Designing the Conglomerate Reporting System -Reasons for Dissatisfaction - Past Attempts at a Solution - Basic Analysis - Designing the Conglomerate Web Services Solution - Defining the Server and the Clients - Deciding on the Transmission Primitives - Designing the Messages - Designing the Project - Redesigning the Shop Floor System - Reasons for Dissatisfaction - Basic Analysis - - Designing the Shop Floor Web Service - Defining the Shop Floor Servers and the Clients - Deciding on the Transmission Primitives - Designing the Shop Floor Messages - Writing the Web Services Code - Designing an E-Commerce Site - Defining the Cheapest Camera Servers and the Clients - Deciding on the Cheapest Camera Transmission Primitives - Designing the Cheapest Camera Messages - Programming the Cheapest Camera Web Service - Uniqueness of Web Services Designs .

UNIT IV The Web Services Architecture (12 Hours)

The Goal of the Web Services Architecture - The SOA - The Major Components of the Architecture - SOAP - Extensible Markup Language - Hypertext Transport Protocol - HTTP State Management Mechanism (Cookies) - Web Services Description Language - The Structures and Data Types of XML Schema - Universal Description, Discovery, and Integration - Understanding Interactions Between Components.

UNIT V The Future of Web Services (12 Hours)

Nontraditional Uses - Using UDDI As a Software Reuse Catalog - Using WSDL as a Design Document - Using SOAP as an EAI Language - A New Version UDDI - UDDI Version 3 - Understanding W3C's Web Services Architecture - WS-Transaction - Business Process Execution Language for Web Services .

TEXT BOOK:

1. Stephen Potts and Mike Kopack" Teach Yourself Web Services in 24 Hours", Sams Indianapolis, Indiana, USA

REFERENCE BOOKS:

1. B.V.Kumar, S.V.Subrahmanya, "Web Services an Introduction", Tata McGraw-Hill Publishing Company Limited.
2. S. Chatterjee, J. Webber, "Developing Enterprise Web Services", Pearson Education.

WEB REFERENCE:

1. https://www.tutorialspoint.com/webservices/what_are_web_services.htm
2. https://www.geeksforgeeks.org/what-are-web-services/
3. https://www.javatpoint.com/what-is-web-service

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	Core: XXVIII ELECTIVE:III	21CAU28A	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 special terms in Basics of Informatics	K1
CO2	Demonstrate 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 – Analyze; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**1**	**1**
CO2	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO4	**9**	**9**	**9**	**3**	**3**	**9**	**1**
CO5	**9**	**9**	**9**	**3**	**3**	**9**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I **Knowledge Skills** **(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 New Threats – Cybersecurity – Computer Harsh Realities

UNIT III **Boinformatics And Immunoinformatics** **(12 Hours)**

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

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

Applications – Geographic Information Systems – Conceptualization of GIS – Remote Sensing – Global Positioning System – Geodesy – Catography –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- Newdelhi
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	21CAU28B	GREEN COMPUTING	**60**	**4**

Contact hours per week: 5

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

Preamble

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

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Label the problems concerning with e-waste and its consequences on environment	K1
CO2	Describe the components involved and how effectively we can achieve cost saving without harming environment	K2
CO3	Inspect the procedural aspects towards going green.	K3
CO4	Categorize the means of green compliance	K4
CO5	Specify the certifications necessary for hardware devices	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**3**	**3**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO4	**9**	**3**	**9**	**3**	**3**	**3**	**1**
CO5	**9**	**3**	**3**	**3**	**3**	**3**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I **Green Computing Essentials** **(12 Hours)**

Overview and Issues: Introduction - green Computing - Problems – Your Company's Carbon Footprint – Cost Savings. **Initiatives and Standards**: Global Initiatives – Comparative study on green initiatives of other countries.

UNIT II **Green Computing Tribulations and Optimizations** **(12 Hours)**

Minimizing Power Usage: Power problems - Monitoring power Usage – Reducing Power Usage – Low power Computers – Components. **Cooling:** Cooling Costs – Reducing Cooling Costs – Optimizing air Flow – Adding Cooling – Datacenter Design.

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

Changing the Way of Work: Old Behaviour – Steps – Teleworkers and Outsourcing. **Going Paperless:** Paper Problems – Paper and Office – Going Paperless – Intranets – Electronic Data Interchange (EDI).

UNIT IV **Green Computing** **(12 Hours)**

Recycling: Problems – Means of Disposal – Life Cycle – Recycling Companies – Hard Drive Recycling. **Hardware Considerations**: Certification Programs – Energy Star – Servers – Hardware Considerations – Remote Desktop.

UNIT V **Green Accomplishment** **(12 Hours)**

Greening Your Information Systems: Initial Improvement Calculations – Change Business Process – Improve Technology Infrastructure. **Staying Green:** Organizational Check-ups – Equipment Check-ups – Certifications – Helpful Organizations.

TEXT BOOK:

1. Tushar Sambare , Sonali Sambare: Green Computing, Himalaya Publishing House, First Edition 2008.

REFERENCE BOOKS:

1. Carl Speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
2. Jason Harris, Green Computing and Green IT- Best Practices on regulations & Industry, Lulu.com, 2008.

WEB REFERENCES:

1. https://www.himpub.com/documents/Chapter1765.pdf
2. https://www.wiley.com/en-us/Empowering+Green+Initiatives+with+IT+%3A+A+Strategy+and+Implementation+Guide-p-x000528886
3. https://www.wiley.com/en-be/exportProduct/pdf/9780470550151
4. http://docplayer.net/102991987-Green-home-computing-learn-to-woody-leonhard-katherine-murray-making-everything-easier-use-your-computer-to-green-your-lifestyle.html

CATERGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE: XXVIII ELECTIVE:III	21CAU28C	ARTIFICIAL INTELLIGENCE	**60**	**4**

Contact hours per week: 5

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

Preamble

To learn about the concepts of Artificial Intelligence(AI).

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	Analyze AI problems using various search techniques	K4
CO5	Assess procedural and declarative knowledge representation methods	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**1.43**	**4.07**	**1.93**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

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-IV	SKILL ENHANCEMENT : III	21SECAU03	SOFTWARE TESTING	**24**	**2**

Contact hours per week: 2

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

Preamble

To learn about the software testing 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 concepts of software testing	K1
CO2	Explain the different software testing methods	K2
CO3	Develop various testing levels for different domains	K3
CO4	Classify various testing techniques that can be used for software testing	K4
CO5	Decide test plans for real time applications	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO5	**9**	**9**	**9**	**9**	**1**	**3**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**25**	**27**	**25**
Weighted Percentage of COs Contribution to POs	**2.61**	**2.75**	**2.74**	**2.95**	**2.39**	**2.44**	**3.21**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT I **Life Cycle Models** **(4 Hours)**

Software Development Life Cycle Models: Requirements Gathering and Analysis - Quality, Quality Assurance, and Quality Control- Testing, Verification, and Validation**.** White Box Testing: What is White Box Testing? - Static Testing - Static Testing by Humans - Static Analysis Tools -Structural Testing - Unit/Code Functional Testing - Code Coverage Testing - Code Complexity Testing - Challenges in White Box Testing.

UNIT II **Black Box Testing** **(5 Hours)**

What is Black Box Testing? -Why Black Box Testing? - When to do Black Box Testing? - How to do Black Box Testing? - Requirements Based Testing - Positive and Negative Testing - Boundary Value Analysis - Decision Tables - Equivalence Partitioning - State Based or Graph Based Testing - Compatibility Testing - User Documentation Testing - Domain Testing.

UNIT III **Integration Testing** **(5 Hours)**

What is Integration Testing? - Integration Testing as a Type of Testing - Integration Testing as a Phase of Testing - Scenario - Defect Bash.

UNIT IV **System and Acceptance Testing** **(5 Hours)**

System Testing: Why is System Testing Done? - Functional System Testing- Non-Functional Testing- Acceptance Testing: Acceptance Criteria-Selecting Test Cases for Acceptance Testing- Executing Acceptance Tests.

UNIT V **Performance Testing and Regression Testing** **(5 Hours)**

Performance Testing: Introduction Factors Governing Performance Testing Methodology for Performance Testing -Collecting Requirements - Writing Test Cases - Automating Performance Test Cases - Executing Performance Test Cases - Analyzing the Performance Test Results - Performance Tuning - Performance Benchmarking - Capacity Planning -Tools for Performance -Testing Process for Performance Testing. Regression Testing: What is Regression Testing? - Types of Regression Testing - When to do Regression Testing? - Best Practices in Regression Testing.

TEXT BOOK:

1. Srinivasan Desikan. Gopalaswamy Ramesh "Software Testing Principles and Practices" Pearson Education

REFERENCE BOOKS :

1. B. Beizer, "Software Testing Techniques", II Edn., DreamTech India, New Delhi, 2003.
2. K.V.K. Prasad , "Software Testing Tools", DreamTech. India, New Delhi, 2005.

WEB REFERENCES:

1. https://www.geeksforgeeks.org/types-software-testing/
2. https://www.ibm.com/in-en/topics/software-testing
3. https://www.guru99.com/software-testing-introduction-importance.html

a) List of elective courses for Semester – V:

*Minimum of 15 students must be admitted in an elective course.
*Elective can be offered as self-study courses.

Course Code	Semester	Course	Hours per Week	Credits
21CAU22A	V	Data Mining	5	4
21CAU22B	V	Introduction to Compiler	5	4
21CAU22C	V	Internet of Things	5	4

b) List of elective courses for Semester – VI:

*Minimum of 15 students must be admitted in an elective course.
*Elective can be offered as self-study courses.

Course Code	Semester	Course	Hours per Week	Credits
21CAU27A	VI	Network Security	5	4
21CAU27B	VI	Big Data Analytics	5	4
21CAU27C	VI	Web Services	5	4
21CAU28A	VI	Informatics	5	4
21CAU28B	VI	Green Computing	5	4
21CAU28C	VI	Artificial Intelligence	5	4

c) Courses for Skill Enhancement:

Course Code	Semester	Course	Hours per Week	Credits
21SECAU01	IV	Programming in Tally -Practical	4	2
21SEU02	V	Life Skills (Jeevan Kaushal) (Curriculum as recommended by UGC)	3	1
21SECAU03	VI	Software Testing	2	2

d) Courses for Ability Enhancement:

Course Code	Semester	Course	Hours per Week	Credits
21AEU01	III	Information Security	2	2
21AEU02	IV	Consumer Rights(Curriculum as recommended by UGC)	3	2

e) Course for Proficiency Enhancement:

Course Code	Semester	Course	Hours per Week	Credits
21PECAU01	V	Case Tools (Self Study)	Self Study No instructional Hours	2

f) Courses for Competency Enhancement:

Semester	Course	Hours per Week	Credit
I - VI	NSS/YRC/RRC/CCC/PHY.EDU/ Others	Self-Paced with Faculty mentoring and Support	1
I - VI	Professional Grooming		1
I - VI	Students Social activity (Related to the Curriculum)	Faculty mentoring and Support	1

Total Credits: 140 credits

Total Marks: 3700

Chair Person

Name, designation

DISTRIBUTION OF MARKS AND QUESTION PAPER PATTERN

FOR SCHOLASTIC COURSES UNDER PART III, IV AND V

OF ALL UG PROGRAMMES – 2021 and onwards

For Scholastic Courses:

S. No.	COMPONENT	TOTAL MARKS	DISTRIBUTION OF MARKS		PASSING MINIMUM FOR (ESE)		OVERALL PASSING MINIMUM FOR (CIA & ESE)
			CIA *	ESE **	CIA *	ESE **	
1.	**Theory / Practical / Project (Both CIA and ESE)** Core / Allied / Any category Open Elective	100	50	50	15	20	40
2.	**100% INTERNAL (ONLY CIA / NO ESE)** Skill Enhancement	50	50	--	20	--	20
3.	**100% EXTERNAL (NO CIA / ONLY ESE)** Foundation Non-Major Elective Ability Enhancement	50	--	50	--	20	20
4.	**100% EXTERNAL (ONLY ESE)** Proficiency Enhancement	100	--	100	--	40	40
5.	Institutional training/ Articleship Training/ Mini Project / Apprenticeship Training **(ONLY CIA / NO ESE)**	100	100	--	40	--	40

*Bloom's Taxonomy based assessment pattern – K1 to K5 levels. K6 is also appreciable.

** ONLY CIA indicates 100% CIA course, ONLY ESE indicates 100% ESE appearance, BOTH indicates CIA and ESE components (WITH MANDATED appearance : Should have attended atleast one CIA and the MODEL exam to take up the ESE).

1. <u>For Courses - Theory / Practical / Project - (Both CIA and ESE) - Core / Allied / Any category</u>
Open Elective :

1.1 <u>For THEORY Courses (BOTH CIA AND ESE):</u>

1.1.1 <u>Distribution of Marks:</u>

<table>
<tr><th>SPLIT – UP</th><th>COMPONENT</th><th>K LEVEL</th><th colspan="2">MARKS</th><th>TOTAL MARKS</th></tr>
<tr><td rowspan="4">CIA</td><td rowspan="3">Assignments: A student is expected to submit three assignments (includes one e-assignment) on any topic relevant to her course as directed by her course instructor based on the assignment schedule provided at the beginning of the semester for every course. K6 - Create level assignments will be appreciated. Marks will be awarded based on concept clarification and justification on the task. Average marks of the three assignments are considered in this case. A student can score a maximum of 10 marks from assignments. (1 assignment – online submission of e-assignment, K6 level assignments will be appreciated.</td><td>K3</td><td>10</td><td rowspan="3">Average of 3 assignments
30/3 = 10</td><td rowspan="4">50</td></tr>
<tr><td>K4</td><td>10</td></tr>
<tr><td>K5</td><td>10</td></tr>
<tr><td>Seminar: A student shall handle a seminar on any topic relevant to her course as directed by her course instructor for which marks shall be awarded based on concept clarification and justification on the task. A student can score a maximum of 5 marks for her seminar.</td><td>K2</td><td colspan="2">5</td></tr>
<tr><td>Others : A student will be evaluated during the semester on her participation in class,</td><td>K1 – K5</td><td colspan="2">5</td></tr>
</table>

SPLIT – UP	COMPONENT	K LEVEL	MARKS	TOTAL MARKS
	case studies presentation, field work, field survey, group discussion, term paper, participation in workshop/conference, presentation of papers in conferences, surprise / informed quizzes from the respective courses that maybe conducted online / offline with simple multiple choice questions, report / content writing, etc. **Average marks** in these activities will fetch her a maximum of 5 marks.			
	CIA I and CIA II tests: A student will be evaluated during the semester in Two CIA tests that would be conducted as per the schedule approved by the academic head. **Average of the two tests** will be considered in this category.	K1 – K5	20	
	Model Exam: A student has to appear for the MODEL EXAM that would be conducted as per the schedule approved by the academic head. Appearance for MODEL EXAM is mandatory for ESE appearance.		10	

* Appearance for at least one CIA component is mandatory.

1.1.2. <u>CIA, Model Exam and ESE Question paper pattern with K-levels:</u>

i) For CIA Tests – 1 Hour test:

SECTIONS / No. of Questions	K LEVEL	MARKS	TOTAL MARKS
Section A: *5 Questions* **(5 X 1 = 5)** *(No Choice)*	K1 K2 (3+2 / 2+3 = 5 questions in total)	5	**25**

SECTIONS / No. of Questions	K LEVEL	MARKS	TOTAL MARKS
Section B: *5 Questions* **(5 X 3 = 15)** Both options of same level *(Either / or Type Questions)*	K2 – 2 Questions K3 – 2 Questions K4 – 1 Question	15	
Section C : *1 Question* **(1 X 5 = 5)** Both options of same level *(Either / or Type Question)*	K3 / K4 / K5 – 1 Question	5	

i) For Model Exam and ESE – 3 Hours exam:

SECTIONS / No. of Questions	K LEVEL	MARKS	TOTAL MARKS
Section A: *10 Questions* **(10 X 1 = 10)** Two questions from all the 5 units *(No Choice)*	K1 - 5 Questions K2 - 5 Questions	10	**50**
Section B: *5 Questions* **(5 X 3 = 15)** One question from all the 5 units / both options from same unit and level *(Either / or Type Questions)*	K2 – 2 Questions K3 – 2 Questions K4 – 1 Question	15	
Section C : *5 Questions* **(5 X 5 = 25)** One Question from every unit / both options from same level *(Either / or Type Questions)*	K3 – 1 question K4 – 2 questions K5 – 2 questions	25	

1.2. <u>For Practical Courses (BOTH CIA and ESE):</u>

i) For CIA:

SPLIT – UP	COMPONENTS	K LEVEL	MARKS	TOTAL MARKS
CIA	Conduct of Experiments / Observations *(Minimum 10 experiments to be conducted/practical course/semester)*	K1 – K5 levels K6 will be appreciable	10	50
	Periodical Lab Tests (Average of TWO) : 15 Marks **(3 HOURS)**		35	
	Model Test : 20 Marks **(3 HOURS)**			
	Record Work #		5	

CIA & MODEL exam Question paper patterns are not defined.
Appearance for at least one CIA is mandatory.

ii) For ESE:

SPLIT – UP	COMPONENTS	K LEVEL	MARKS	TOTAL MARKS
ESE (3 HOURS)	**Experiment / Activity: 1** Algorithm/Steps/Procedure/Logic Input/Execution/Observations/Output/Result	K1 – K5 levels K6 will be appreciable	10 10	50
	Experiment / Activity: 2 Algorithm/Steps/Procedure/Logic Input/Execution/Observations/Output/Result		10 10	
	Record Work #		10	

Record work is MANDATED for appearance in the ESE. Failing to submit will disqualify the candidate from appearing for the ESE.

- There shall be change in the components measured depending on the nature of the course and is left to the discretion of the department.

2. For THEORY COURSES that are 100% INTERNAL (ONLY CIA / NO ESE - 50 Marks):

2.1. CIA Mark Split-up and CIA Question Paper pattern with K-levels:

SPLIT – UP	COMPONENTS	K LEVEL	MARKS	TOTAL MARKS
CIA	**Test I :** 2 questions **2 X 5 = 10** 1 Hour Either / or type Questions *Both options from the same level*	K1, K2,K3, K4,K5 Any level can be used	10	50
	Test II : 2 questions **2 X 5 = 10** 1 Hour Either / or type Questions *Both options from the same level*		10	
	Test III : 5 questions **5 X 5 = 25** 2 Hours (To be conducted as Model Exam) One question from each unit *(*Either / or type*)* *Both options from the same unit / same level*		25	
	Assignment 1 **X 5 = 5** (One assignment - Meaning, definition and concept clarification from various sources)	K1 – K5 levels K6 will be appreciable	5	

Note : 100% CIA ONLY, NO ESE.

3. For THEORY COURSES that are 100% EXTERNAL (NO CIA / ONLY ESE - 50 Marks):

3.1. ESE Question Paper pattern with K-levels:

SPLIT – UP	COMPONENTS	K LEVEL	TOTAL MARKS
ESE **(3 HOURS)**	**Section A** 5 Questions **5 X 10 = 50** One question from each unit *(*Either / or type*)* *Both options from the same unit / same level*	K1, K2,K3, K4,K5 Any level can be used	50

Note : NO CIA, 100% ESE ONLY.

4. For THEORY COURSES that are 100% EXTERNAL (NO CIA / ONLY ESE - 100 Marks):

4.1. ESE Question Paper pattern with K-levels:

SPLIT – UP	COMPONENTS	K LEVEL	TOTAL MARKS
ESE **(3 HOURS)**	**Section A** 5 Questions **5 X 20 = 100** One question from each unit *(*Either / or type*)* *Both options from the same unit / same level*	K1, K2, K3, K4, K5 Any level can be used	100

Note : NO CIA, 100% ESE ONLY.

5. Institutional training/ Articleship Training/ Mini Project/ Apprenticeship Training (ONLY CIA / NO ESE):

5.1. Institutional Training:

Institutional Training reports are evaluated (K1 to K5 levels) at the end of semester- V by the **Internal Examiners** only with prior permission and appointment by CoE. Following weightages shall be used to evaluate the institutional training report:

COMPONENTS*	K LEVEL	MARKS	TOTAL MARKS
Understanding and articulation of concepts	K1, K2, K3, K4, K5 Any level can be used	30	**100**
Clarity and comprehensiveness of presentation in the report		30	
Structure and neatness of the report		40	

* 100% CIA, NO ESE.

*Different metrics may be evaluated depending on the nature of the work carried out during the training period and is left to the discretion of the department.

5.2. ARTICLESHIP TRAINING:

Articleship Training reports are evaluated based on the following rules:

1. Each student should undergo 100 hours of Apprenticeship Training during IV and V Semester course of study.
2. The training report is not less than 30 type written pages should be submitted within one month after the completion of the apprenticeship period.
3. If a student fails to undergo the apprenticeship programme on medical grounds/due to lack of attendance either in the IV semester or in the V semester (or) in both semesters, she should undergo the same after completion of 6^{th} semester. For this prior permission should be obtained from the Principal with the recommendation of the Head of the Department and Controller of Examinations. In such a case training report should be submitted within one month after the completion of the apprenticeship period.
4. In case of failure to submit the report within the above stipulated period, the date of submission may be extended to 15 working days with a late fee as prescribed by the Principal. Further extension, if necessary, may be granted by the College Council on special request.
5. The Apprenticeship report shall be evaluated for a total of 100 marks, out of which 50 marks shall be allotted to the apprenticeship programme to be evaluated by auditor and

50 marks to the apprenticeship report to be evaluated by the Department.

6. A student should secure a minimum of 20 marks each (Auditor & Department) in the apprenticeship programme and 40 marks in the training report to qualify for a pass in the 'Apprenticeship Report'.
7. If any candidate indulges in malpractice while attending the apprenticeship programme or fails to secure a minimum pass mark in the apprenticeship programme as evaluated by the auditor, the report will not be considered for the evaluation by the Department. In that case, student has to undergo Apprenticeship Programme once again and resubmit the report within one month after completion of Apprenticeship Programme.
8. If any candidate fails to secure a minimum pass mark in the 'Apprenticeship Report' as evaluated by the department, the candidate has to resubmit the report after carrying out the suggestions given by thedepartmentwithin10 days after the publication of the results.

5.3. Mini-Project:

Departments encouraging project work may adopt the following structure for evaluation of report; else, they shall define their own rubrics as per need. Following components shall be used for evaluation:

5.3.1 ONLY CIA / NO ESE:

The **project reports** are evaluated during the semester by the **Internal Examiners**.

SPLIT - UP	COMPONENTS	K LEVEL	MARKS	TOTAL MARKS
CIA	Regularity	K1, K2, K3, K4, K5 Any level can be used	15	100
	Review / Presentation		15	
	Knowledge about the organisation / theme of study		20	
	Nature of Work / Logic behind the study		10	
	Learning Outcome		20	
	Viva – Voce		20	

***Viva-Voce for projects will be conducted by internal examiners.**

5.3.2 BOTH CIA AND ESE:

The **project reports** are evaluated at the end of semester jointly by the **Internal Examiners** and **External Examiner** only with prior permission and as appointment by CoE.

SPLIT - UP	COMPONENTS	K LEVEL	MARKS	TOTAL MARKS
CIA	Regularity	K1, K2, K3, K4, K5	15	50
	Review / Presentation		15	
	Knowledge about the organisation / theme of study		20	
ESE*	Nature of Work / Logic behind the study	Any level can be used	10	50
	Learning Outcome		20	
	Viva – Voce		20	

***ESE Viva-Voce for projects will be jointly conducted by internal and external examiners.**

- There shall be change in the components measured depending on the nature of the course and is left to the discretion of the department.

5.4. Apprenticeship Training:

Refer the syllabus of B.COM (PA) Batch 2021 - 2024

GUIDELINES FOR SCHOLASTIC COURSES

S.No.	Particulars
1	**Credit transferability for courses**
2	**For Courses under Part- III**
	2.1. Institutional training / Articleship Training / Mini Project / Apprenticeship Training :
	2.2. Open Elective :
3	**For Courses under Part- IV**
	3.1. Skill Enhancement
	3.2. Ability Enhancement
4	**For Courses under Part- V**
	4.1. Proficiency Enhancement
	4.2. Competency Enhancement
	4.2.1. NSS/ YRC/ CCC/ Physical Education/ Others
	4.2.2. Professional Grooming
	4.2.3. Students Social activity (Related to the Curriculum)

1. Credit transferability for courses:

In lieu with the direction of the University Grants Commission (UGC) for universities and colleges to use the Massive Open Online Courses (MOOC) available on the HRD Ministry's 'Swayam' platform for credit transfer, students who complete a course in their curriculum (the courses approved by Swayam board, are ready to be offered in the July semester 2020 AND ONWARDS) are permitted to transfer their credit and can be exempted from appearing the particular course in their curriculum. The score obtained will be accounted for CGPA calculation. The credits earned can be transferred under PART-III/PART-IV/PART-V of ANY SEMESTER with due recommendation of the Chairperson of the Board and approval from the CoE.

2. For courses under PART III :

Score obtained in these courses WILL BE ACCOUNTED FOR CGPA CALCULATION.

2.1. Institutional training / Articleship Training / Mini Project :

Course Code	Semester	Course	Evaluation	Credits
	V	Institutional training/ Articleship Training/ Mini Project/ Apprenticeship Training	NO ESE 100% CIA	2

i) Institutional / Industrial Training:

A student shall visit an institution / organisation and learn its operations according to the nature of her discipline of study after approval from the Department, for a period of 21 WORKING DAYS during her summer vacation between semesters IV and V. Work carried out during this period will have to be recorded in a work diary provided by the department. An institutional training report should be submitted by the student at the end of the fifth semester (ESE) to complete the programme and is duly evaluated by the INTERNAL EXAMINER ONLY.

ii) Articleship Training:

A student shall register herself as an article with a practicing CA with due approval from the Department, for a period of 21 WORKING DAYS during her summer vacation between semesters IV and V. Work carried out during this period will have to be recorded in a work diary provided by the department. An articleship training report should be submitted by the student at the end of the fifth semester (ESE) to complete the programme and is duly evaluated by the INTERNAL EXAMINER ONLY.

iii) Mini Project:

A student shall visit an institution / organisation and investigate a problem on the core business activity also pertaining to the nature of her discipline of study with due approval from the Department, for a period of 21 WORKING DAYS during her summer vacation between semesters IV and V. Work carried out during this period will have to be recorded in a work diary provided by the department. A mini project report should be submitted by the student at the end of the fifth semester (ESE) to complete the programme and is duly evaluated by the INTERNAL EXAMINER ONLY.

2.2. Open Elective :

Open elective courses are core courses offered DURING SEMESTER V under Part: III for students of other UG programmes, where a student can choose any course offered under this category from other than her parent department. Notification is handled on advice of the academic head and enrollment for the course is done on first come first serve basis depending upon the available strength. The course is taught and is administered by the norms pertaining to the department which offers the course. Adherence to the scheme, syllabus, distribution of marks and question paper pattern as found in the curriculum of the parent department is MANDATORY. Score obtained in this course will be accounted for CGPA calculation. Following is the list of courses available for the students of the UG programme.

List of open elective courses offered for the students admitted in UG programmes from the academic year 2021-22 and onwards

Course Code	Department	Course	Evaluation	Credit
21ENUOE01	Department of English	English for effective communication	Both CIA and ESE	2
21TAUOE02	Department of Tamil	திறன் மேம்பாட்டுக் கல்வி		
21MAUOE01	Department of Mathematics	Mathematics for Business		
21PHUOE01	Department of Physics	Physics in day to day life		
21CSUOE01	Department of Computer Science	Internet For Everyone		
21ITUOE01		Basics of Computer Technology		
21CAUOE01		Machine Learning		
21CGUOE01	Department of Commerce	Basics of Accounting		
21CCUOE01		E- advertising		
21CPUOE02		Human resource management		
21BAUOE01	Department of Management	Start-up Business		

3. For courses under PART IV :

Score obtained in these courses WILL NOT BE ACCOUNTED FOR CGPA CALCULATION.

3.1 Skill Enhancement :

Course Code	Semester	Course	Evaluation	Credits
21SECAU01	IV	Programming in Tally –Practical	To be conducted and evaluated by the Internal Examiner 100% CIA NO ESE	2
21SEU02	V	Life Skills (Jeevan Kaushal) (Curriculum as recommended by UGC)		2
21SECAU03	VI	Software Testing		2

NOTE: Weekly three hours theory and / or blended practical activities conducted as individual/group tasks or assignments (online and offline) in direct supervision of faculty member during semesters (IV, V and VI) and the assessment is to be done by the INTERNAL EXAMINER ONLY. NO ESE.

3.2. Ability Enhancement:

Course Code	Semester	Course	Evaluation	Credits
21AEU01	III	Information Security	NO CIA 100% ESE	2
21AEU02	IV	Consumer Rights		2

On successful completion of these courses, students will be able to demonstrate skills necessary for tackling challenges in today's digitalized world driven by consumerism. They are also taught relating to the main stream of study and hence, ensure job readiness after completion of the UG programme.

4. For courses under PART V :

Score obtained in these courses WILL NOT BE ACCOUNTED FOR CGPA CALCULATION.

4.1. Proficiency Enhancement:

Course Code	Semester	Course	Evaluation	Credits
21PECAU01	V	Case Tools (Self Study)	NO CIA 100% ESE	2

These courses are provided to enhance the academic proficiency of a student. No lecture hours are provided and therefore, these are SELF STUDY courses and the students are expected to prepare the courses on the prescribed syllabi by their own. Students have to appear for the ESE that would be conducted as per the curriculum specification of each department and scoring a passing minimum is mandatory for completion of the UG programme.

4.2. Competency Enhancement :

Competency enhancement activities are conducted by the college / department between semesters I and IV or I and VI, as is applicable. Evaluation is done under Part: V for 3 credits and credits are awarded based on submission of proofs for completion of the components mentioned therein. Obtaining a grade is MANDATORY for completion of the programme.

4.2.1. NSS/ YRC/ CCC/ Physical Education/ Others:

Semester	CATEGORY	Course Completion	Credit
I – VI	NSS/ YRC/ CCC/ Physical Education/ Others	Upon personal choice and as guided by faculty mentor	1

A student can choose to involve and engage in activities that college / department and her faculty mentors plan under NSS/ YRC/ CCC/ Physical Education/ Others to instill social consciousness, citizenship, moral building and serve her immediate community. Submission of a certificate of completion as a proof, to the class tutor is MANDATORY.

4.2.2. Professional Grooming:

Semester	Category	Course Completion	Credit
I – VI	Professional Grooming	As guided by faculty mentor	1

Students will be taught to care take of themselves and their body, and it's something everyone can and should do. This component is included to cultivate professionalism amongst students and educate them with strategies aimed at enhancing knowledge, skills and abilities in becoming a professional. Submission of a certificate of completion as a proof, to the class tutor is MANDATORY.

4.2.3. Students Social activity (Related to the Curriculum):

Semester	Category	Course Completion	Credit
I – VI	Students Social activity (Related to the Curriculum)	As guided by faculty mentor	1

A student shall engage in activities that her department and apply the knowledge gained in her curriculum in addressing some pressing issues of her neighbourhood for societal good. Submission of a certificate of completion as a proof, to the class tutor is MANDATORY.

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PART – III – CORE COURSES: 50 MARKS

Course Code : …….. **Reg. No. :**

P.K.R ARTS COLLEGE FOR WOMEN (Autonomous), GOBICHETTIPALAYAM
…UG…. DEGREE ESE EXAMINATION, …… – 2021
Branch – …….
Semester …..
(For the candidates admitted from 2021)
< Title of the Subject >

Time : 3 Hours **Maximum Marks : 50**

Answer ALL the Sections
SECTION – A (10 × 1 = 10 Marks)
(Bloom's Taxonomy K1 / K2 Level)

Answer the following

S. No.	Question	KNOWLEDGE LEVEL
1.	Unit I	K1
2.	Unit I	K2
3.	Unit II	K1
4.	Unit II	K2
5.	Unit III	K1
6.	Unit III	K2
7.	Unit IV	K1
8.	Unit IV	K2
9.	Unit V	K1
10.	Unit V	K2

SECTION – B (5 × 3 = 15 Marks)
(Bloom's Taxonomy K2 / K3 / K4 Level)
(Bloom's Taxonomy: K2 – 2 questions, K3 – 2 questions, K4 – 1 question)
(Options (a) and (b) should be from same unit and same knowledge level)
Answer ALL Questions

S. No.	Question			KNOWLEDGE LEVEL
11.	(a)	Unit I	**(OR)**	
11.	(b)	Unit I		
12.	(a)	Unit II	**(OR)**	
12.	(b)	Unit II		
13.	(a)	Unit III	**(OR)**	
13.	(b)	Unit III		
14.	(a)	Unit IV	**(OR)**	
14.	(b)	Unit IV		
15.	(a)	Unit V	**(OR)**	
15.	(b)	Unit V		

SECTION – C (5 × 5 = 25 Marks)
(Bloom's Taxonomy K4 / K5 Level)
(Bloom's Taxonomy: K3 – 1 question, K4 – 2 questions, K5 – 2 questions)
(Options (a) and (b) should be from the same unit and same knowledge level)
Answer ALL Questions

S. No.	Question			KNOWLEDGE LEVEL
16	(a)	Unit I	**(OR)**	
16.	(b)	Unit I		
17.	(a)	Unit II	**(OR)**	
17.	(b)	Unit II		
18.	(a)	Unit III	**(OR)**	
18.	(b)	Unit III		
19.	(a)	Unit IV	**(OR)**	
19.	(b)	Unit IV		
20.	(a)	Unit V	**(OR)**	
20.	(b)	Unit V		

K –LEVEL	Q.NO.	No. of Questions
K1	1,3,5,7,9	5
K2	2,4,6,8,10, 2 QUESTIONS IN SECTION B	5 2
K3	2 QUESTIONS IN SECTION B 1 QUESTION IN SECTION C	3
K4	1 QUESTION IN SECTION B 2 QUESTIONS IN SECTION C	3
K5	2 QUESTIONS IN SECTION C	2
	TOTAL	**20 QUESTIONS**

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PART – IV – COURSES: 50 MARKS

Course Code : …….. **Reg. No. :** | | | | | | | | | | |

P.K.R ARTS COLLEGE FOR WOMEN (Autonomous), GOBICHETTIPALAYAM
…UG…. DEGREE ESE EXAMINATION, …… – 2021
Branch – …….
Semester …..
(For the candidates admitted from 2021)
< Title of the Subject >

Time : 3 Hours **Maximum Marks : 50**

Answer ALL the Questions
SECTION – A (5 × 10 = 50 Marks)
(Bloom's Taxonomy K1/K2 / K3 / K4 /K5 Levels)
(Options (a) and (b) should be from same unit and same knowledge level)
Answer ALL Questions

S. No.	Question			KNOWLEDGE LEVEL
1.	(a)	Unit I	**(OR)**	
1.	(b)	Unit I		
2.	(a)	Unit II	**(OR)**	
2.	(b)	Unit II		
3.	(a)	Unit III	**(OR)**	
3.	(b)	Unit III		
4.	(a)	Unit IV	**(OR)**	
4.	(b)	Unit IV		
5.	(a)	Unit V	**(OR)**	
5.	(b)	Unit V		

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PART – IV – COURSES: 100 MARKS

Course Code : …….. **Reg. No. :**

P.K.R ARTS COLLEGE FOR WOMEN (Autonomous), GOBICHETTIPALAYAM
…UG…. DEGREE ESE EXAMINATION, …… – 2021
Branch – …….
Semester …..
(For the candidates admitted from 2021)
< Title of the Subject >

Time : 3 Hours **Maximum Marks : 100**

Answer ALL the Questions
SECTION – A (5 × 20 = 100 Marks)
(Bloom's Taxonomy K1/K2 / K3 / K4 /K5 Levels)

(Options (a) and (b) should be from same unit and same knowledge level)
Answer ALL Questions

S. No.	Question			KNOWLEDGE LEVEL
1.	(a)	Unit I	**(OR)**	
1.	(b)	Unit I		
2.	(a)	Unit II	**(OR)**	
2.	(b)	Unit II		
3.	(a)	Unit III	**(OR)**	
3.	(b)	Unit III		
4.	(a)	Unit IV	**(OR)**	
4.	(b)	Unit IV		
5.	(a)	Unit V	**(OR)**	
5.	(b)	Unit V		

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CO-SCHOLASTIC COURSES OFFERED FOR THE STUDENTS ADMITTED IN THE UG PROGRAMMES IN 2021-22 AND ONWARDS

CO - SCHOLASTIC COURSES FOR UG PROGRAMMES:

The co-scholastic courses are offered with an intention to provide learner centric, skill oriented technical training that help an individual to showcase their competency, learn commitment for the profession, add value and build expertise in their area of study and helps with job advancement / career building opportune for students of all UG programmes. Evaluation in this category is done by INTERNAL EXAMINERS / COMPETENT CERTIFYING PROFESSIONAL BODIES / PROFESSIONAL INSTITUTIONS as is required, at the end of the semester/ an academic year. Score obtained in this category WILL NOT BE ACCOUNTED FOR CGPA CALCULATION.

Every course is taught 40 Hours in a year and assessment is made at the end of the academic year (even semester ESE ONLY). Students who score the passing minimum will be given certificates with grades, based on the marks scored during the final Examination.

Following are the co-scholastic courses offered for the students admitted in the UG programmes during the academic year 2021-22 and onwards:

Categories available for students admitted in UG Programmes:

1. VALUE ADDED COURSES
2. CERTIFICATE COURSES
3. ADD-ON COURSES
4. EXTRA CREDIT COURSES

are the FOUR categories of CO-SCHOLASTIC COURSES offered to nurture - choice based skill / ability / proficiency / competency enhancement of an individual in addition to the courses specified under the scheme of examinations for scholastic courses of the UG programmes.

Scheme of examination for Co-Scholastic Courses:

1. VALUE ADDED COURSES:

Pattern	Department	Course Code	Course Title	Contact Hours / week	Exam Duration Hours	Max. Marks @ annual Exam		
						Theory	Practical	Total
Course to be taught after regular hours **I YEAR**								
Value Added Course I								
Annual	Tamil	21TAVAU1	,jopay;	2 (Sem I) 2 (Sem II)	3	50	50	100
	English	21ENVAU1	CONVERSATIONAL ENGLISH					
	Mathematics	21MAVAU1	VEDIC MATHEMATICS					
	Physics	21PHVAU1	CRYSTAL PHYSICS					
	Computer Science	21CSVAU1/ 21CAVAU1/ 21ITVAU1	COMPUTER FUNDAMENTALS & OFFICE AUTOMATION					
	Commerce	21CGVAU1/ 21CPVAU1/ 21CCVAU1	INTELLIGENCE FOR EXCELLENCE					
	Management	21BAVAU1	BASICS OF FOOD SCIENCE					
Value Added Course II **II YEAR**								
Annual	Tamil			2 (Sem I) 2 (Sem II)	3	50	50	100
	English							
	Mathematics							

	Physics							
	Computer Science		PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES					
	Commerce							
	Management							
Value Added Course III III YEAR								
Annual	Tamil			2 (Sem I)	3	50	50	100
	English							
	Mathematics							
	Physics							
	Computer Science		SOFTWARE DEVELOPMENT	2 (Sem II)				
	Commerce							
	Management							

2. CERTIFICATE COURSES

Semester	Department	Course Code	Course Title	Contact Hours / week	Exam Duration Hours	Max. Marks @ Annual Exam		
						Theory	Practical	Total
Course to be taught after regular hours								
Certificate Course								
Semester III and Semester IV (Annual)	Tamil	21TACCU1	NahfKk; ,isQh; ty;yikAk;	2 (Sem I)	3	50	50	100
	English	21ENCCU1	English for Competitive Examinations					
	Mathematics	21MACCU1	Matlab	2 (Sem II)				
	Physics	21PHCCU1	Basic Electronics					

	Computer Science	21CSCCU1/ 21ITCCU1/ 21BCCCU1	Fundamentals of Oracle					
	Commerce	21CGCCU1/ 21CCCCU1/ 21CPCCU1	Forensics Accounting					
			Social Media Marketing					
			Business Process Outsourcing					
	Management	21BACCU1	Accounting Executive with GST					

3. ADD-ON COURSES

Category	Course Code	Course Title	Contact Hours / week	Exam Duration Hours	Max. Marks		
					CIA	ESE	Total
Course to be taught after regular hours, students could register ONLY during I year of study.							
ADD-ON COURSE - I		Functional English (Offered by the Department of English)	2	3	50	50	100
ADD-ON COURSE - II		Yoga and meditation (Offered by the Department of Tamil)	2	3	50	50	100

4. EXTRA CREDIT COURSES (Self-study courses)

There are five categories , namely,

4.1 Courses offered (Not chosen electives by the candidate) by parent department for ALL STUDENTS OF THE PROGRAMME

4.2 List of courses offered for ADVANCED LEARNERS ONLY

4.3 Courses offered in a department under PART-III for STUDENTS OF OTHER PROGRAMMES – Inter-disciplinary courses

4.4 Credit transferability for Disciplinary / Inter-disciplinary / Trans-disciplinary / General courses offered in UGC SWAYAM MOOCS

4.5. Comprehension Courses

4.1 Courses offered (Not Chosen electives by the candidate) by parent department for ALL STUDENTS OF THE PROGRAMME: Refer to the scheme of examinations of the programme for the list of courses.

4.2 List of courses offered for ADVANCED LEARNERS ONLY :

Department	Course Code	Courses offered for ADVANCED LEARNERS ONLY
Department of English	21ENALU1	Dalit literature
	21ENALU2	Science fiction
	21ENALU3	Indian Diasporic literature
	21ENALU4	Literature and Mythology
Department of Tamil	21TAALU1	மக்கள்ஊடகத்தொடர்பியல்
	21TAALU2	இணையம்கற்போம்
	21TAALU3	இந்தியக்கலைவரலாறு
	21TAALU4	அரவாணிகள்அன்றும்இன்றும்
Department of Mathematics	21MAALU1	Numerical Techniques
	21MAALU2	Matrix theory
	21MAALU3	Group Theory
	21MAALU4	Programming in C
Department of	21PHALU1	Digital Literacy

Physics	21PHALU2	Python Programming
	21PHALU3	Acoustics
	21PHALU4	Theory of Relativity
Department of Computer Science	21CSALU1	Block chain technology
	21CSALU2	Introduction to Data Compression
	21CSALU3	Green marketing management
	21CSALU4	Mobile commerce
Department of Commerce	21CGALU1	Event management
	21CGALU2	Secretarial practices
	21CGALU3	Business Legislations
	21CGALU4	E-Governance
Department of Management	21BAALU1	Digital marketing
	21BAALU2	Tourism & Hospitality management
	21BAALU3	Stress management & Emotional intelligence
	21BAALU4	Export management

4.3 Courses offered in a department under PART-III for STUDENTS OF OTHER PROGRAMMES – Inter-disciplinary courses - Refer to the scheme of examinations of the UG programme for the list of courses.

4.4 Credit transferability for Disciplinary / Inter-disciplinary / Trans-disciplinary / General courses offered in UGC SWAYAM MOOCS: Refer to the UGC SWAYAM eligibility, guidelines for courses available in the official website.

4.5. Comprehension Courses :

Department	Course Code	Comprehension Courses
Department of Tamil	21TAU1	Comprehension in Tamil - I
	21TAU2	Comprehension in Tamil - II
	21TAU3	Comprehension in Tamil - III
	21TAU4	Comprehension in Tamil - IV
	21TAU5	Comprehension in Tamil - V
	21TAU6	Comprehension in Tamil - VI
Department of English	21ENU1	Comprehension in English - I
	21ENU2	Comprehension in English - II
	21ENU3	Comprehension in English - III
	21ENU4	Comprehension in English - IV
	21ENU5	Comprehension in English - V
	21ENU6	Comprehension in English - VI
Department of Mathematics	21MAU1	Comprehension in Mathematics - I
	21MAU2	Comprehension in Mathematics - II
	21MAU3	Comprehension in Mathematics - III
	21MAU4	Comprehension in Mathematics - IV
	21MAU5	Comprehension in Mathematics - V
	21MAU6	Comprehension in Mathematics - VI

Department of Physics	21PHU1	Comprehension in Physics - I
	21PHU2	Comprehension in Physics - II
	21PHU3	Comprehension in Physics - III
	21PHU4	Comprehension in Physics - IV
	21PHU5	Comprehension in Physics - V
	21PHU6	Comprehension in Physics - VI
Department of Computer Science	21CSU1	Comprehension in Computer Science - I
	21CSU2	Comprehension in Computer Science - II
	21CSU3	Comprehension in Computer Science - III
	21CSU4	Comprehension in Computer Science - IV
	21CSU5	Comprehension in Computer Science - V
	21CSU6	Comprehension in Computer Science - VI
Department of Commerce	21CGU1	Comprehension in Commerce - I
	21CGU2	Comprehension in Commerce - II
	21CGU3	Comprehension in Commerce - III
	21CGU4	Comprehension in Commerce - IV
	21CGU5	Comprehension in Commerce - V
	21CGU6	Comprehension in Commerce - VI
Department of Management	21BAU1	Comprehension in Management - I
	21BAU2	Comprehension in Management - II
	21BAU3	Comprehension in Management - III
	21BAU4	Comprehension in Management - IV
	21BAU5	Comprehension in Management - V
	21BAU6	Comprehension in Management - VI

In the comprehension component, students are tested on their grasping ability of the courses of study. Comprehension in ……. - I, II, III, IV, V,VI are SELF-STUDY courses courses that have only MCQ from Part III Courses. ONLINE EXAMINATION (END-SEMESTER) consisting of 50 Multiple Choice Questions (on Core and Core Elective courses studied in the respective semesters) will be conducted at the end of each semester I, II, III, IV,V AND VI respectively, for a maximum of 100 marks.

Self Study: Online Exams will be conducted at the end of each semester with one credit each.

Distribution of Marks for Co-Scholastic Courses:

Category	Theory	Practical	Total Marks	PASSING MINIMUM @ ANNUAL EXAM	Grade
BOTH Theory and Practical	50	50	100	**40**	Marks 90 - 100 - A++ Outstanding Marks 80 – 89 - A+ Excellent Marks 70 – 79 - A Very Good Marks 60 - 69 - B+ Good Marks 50 – 59 - B Average Marks 40 – 49 - C Satisfactory Marks 0 - 39 - U Re-appear
ONLY Theory	100	--	100	40	
ONLY Practical	--	100	50	40	

Question Paper pattern for Co-Scholastic Courses:

<table>
<tr><th>SPLIT – UP</th><th colspan="2">COMPONENTS</th><th>TOTAL MARKS</th></tr>
<tr><td>ONLY Theory
100 marks</td><td colspan="2"><u>ANNUAL EXAM</u>
Section A 5 X 20 = 100 3 Hours
One question from each unit
(Either / or type)
Both options from the same unit / same level
K1, K2,K3,K4,K5, K6 - ANY LEVEL</td><td>100</td></tr>
<tr><td rowspan="5">Both
Theory and
Practical

100 marks</td><td>Seminar</td><td>5</td><td rowspan="4">100</td></tr>
<tr><td>A student will be evaluated during the semester on her participation in class, case studies presentation, group discussion, surprise / informed quizzes that may be conducted online / offline with simple multiple choice questions, etc. Average marks in these activities will fetch her maximum of 25 marks.</td><td>20</td></tr>
<tr><td>Completion of activities / experiments / exercises</td><td>15</td></tr>
<tr><td>Viva-Voce</td><td>10</td></tr>
<tr><td colspan="2"><u>ANNUAL EXAM</u>
Section A 5 X 10 = 50 1.5 Hours
One question from each unit
(Either / or type)
Both options from the same level
K1, K2, K3, K4,K5, K6 - ANY LEVEL</td><td>50</td><td></td></tr>
</table>

ONLY Practical **100 marks**	Record / Observation	10	100
	Completion of activities / experiments / exercises	20	
	2 experiments on the day of assessment	60	
	Viva-Voce	**10**	

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VALUE ADDED COURSES
SYLLABUS

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
VALUE ADDED COURSE		COMPUTER FUNDAMENTALS & OFFICE AUTOMATION	40		

Preamble

To provide a crisp knowledge on basic fundamentals of the computers, working procedure on the windows and practice the system environment functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the fundamental characteristics of the computer, algorithms, features of operating system	K1
CO2	Determine the types of computer, memory devices, structure of flowchart and various types of operating system	K2
CO3	Analyse the number system and windows working environment	K3
CO4	Describe the various editors and word processors used in MS Office	K4
CO5	Apply the features of the flowchart in coding and automate the data into presentations, documents and spreadsheets.	K5

COURSE CONTENT

UNIT I (10 Hours) **Introduction to Computers**

Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories. Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication

UNIT II (8 Hours) **Algorithm and Flowcharts**

Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples.

UNIT III (8 Hours) **Operating System and Services in O.S.**

Dos – History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.

UNIT IV (6 Hours) **Windows Operating Environment**

Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

UNIT V (8 Hours) **Editors and Word Processors**

Basic Concepts, Examples: MS-Word, Introduction to desktop publishing. Spreadsheets and Database packages Purpose, usage, command, MS-Excel, MS-PowerPoint.

REFERENCE BOOK:

1. Archana Kumar,"Computer Basics with Office Auomation", IK International Publishing House Pvt. Ltd, First Edition. ISBN:9789380578620.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
VALUE ADDED COURSE		**PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES**	40		

COURSE CONTENT

OBJECTIVES:

- ✓ To develop the language skills of students by offering adequate practice in professional contexts.
- ✓ To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- ✓ To focus on developing students' knowledge of domain specific registers and the required language skills.
- ✓ To develop strategic competence that will help in efficient communication
- ✓ To sharpen students' critical thinking skills and make students culturally aware of the target situation

LEARNING OUTCOMES:

- ✓ Recognise their own ability to improve their own competence in using the language
- ✓ Use language for speaking with confidence in an intelligible and acceptable manner
- ✓ Understand the importance of reading for life
- ✓ Read independently unfamiliar texts with comprehension
- ✓ Understand the importance of writing in academic life
- ✓ Write simple sentences without committing error of spelling or grammar (Outcomes based on guidelines in UGC LOCF – Generic Elective).

NB: All four skills are taught based on texts/passages.

UNIT 1 (8 Hours) COMMUNICATION

Listening: Listening to audio text and answering questions

- Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks.

UNIT 2 (8 Hours) DESCRIPTION

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning- Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition- Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3 (8 Hours) NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping).

Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4 (8 Hours) PRESENTATION SKILLS

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations

Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 5 (8 Hours) CRITICAL THINKING SKILLS

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading: Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
VALUE ADDED COURSE		SOFTWARE DEVELOPMENT	40		

Preamble

To provide knowledge on basic software development structure, working procedure and practice the system environment functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the characteristics software development, roles and responsibilities and pros and cons of designing.	K1
CO2	Determine the methodologies used to develop a software	K2
CO3	Analyze the Requirements, design and development structure of software.	K3
CO4	Describe the various testing and process needed to maintain software.	K4
CO5	Apply the features of database and develop a simple software.	K5

COURSE CONTENT

UNIT I (8 Hours) **Software an Outlook**

Introduction - Software Products and Ideas Behind - Different Models - Research and Development - Knowledge Sharing Platform - Minimum Viable Product. **Roles, Responsibilities, and Methodologies:** Roles and Responsibilities - Business Owner - Product Manager - Designers - Backend - Frontend - Quality Assurance (QA) - DevOps (development + operations) - It's Normal to be Confused About Roles! - Methodologies - Our Team and Process

UNIT II (8 Hours) **Necessities and Proceeding**

Requirements, Commitment, and Deadlines: Product Manager - Preparation-Requirements and Roadmap - Kick-Off - Commitment and Deadline - Requirements for Our MVP. **User-Centered Design:** Design Journey—Its Start and End - Types of Design User Interface and User Experience - Design Process—How Designers Run It - Designing Our Online Education Platform - Initial Brainstorming - Usability Testing

UNIT III (8 Hours) **Backend Development**

Backend Development: About the Stack - Defining Backend Applications -Bootstrapping the Project - Build Automation Tool: Maven - Database - Pros – Cons – Authentication - Development - Database - Persistence Layer - Service Layer - Service API -REST API and Transformation Layer -Implementing the Registration –Testing.

UNIT IV (8 Hours) Frontend Development

Frontend Development: Where Does Frontend Start? - Markup and DOM - Document Object Model - Headings - Hyperlinks - Images - Forms - Inline and Block Elements - Style - Layout - Design Systems - Pre-Processors and Template Engines - Dynamic Content - Development Tools Console - Variables - Including JavaScript – Functions - Frameworks - Contract Between Frontend and Backend - Creating the Frontend Application for Our Platform .

UNIT V (8 Hours) Testing and Maintenance

Testing Our Product: Different Types of Testing - Who Is Testing What? - Tools, Platforms, and Frameworks - Testing Our Product. **Maintaining and Improving Your Software:** Maintaining – Improving.

REFERENCE BOOK:

1. Olga Filipova, Rui Vilao "**Software Development From A to Z -** A Deep Dive into all the Roles Involved in the Creation of Software " Apress Publication

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ISBN-13 (electronic): 978-1-4842-3945-2(ebook)

CERTIFICATE COURSES

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CERTIFICATE COURSE		FUNDAMENTALS OF ORACLE	40	-	-

COURSE CONTENT

UNIT I (8 Hours) Introduction to Database System

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms

UNIT II (6 Hours) Oracle9i

Oracle9i: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Alternate Text Editors .

UNIT III (8 Hours) Oracle Tables

Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table

UNIT IV(8 hours) 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

UNIT V (10 Hours) Functions and Grouping

Built-in functions–Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.

TEXT BOOK:

1.Nilesh Shah, Database Systems Using Oracle, 2nd edition, PHI.

REFERENCE BOOKS:

1.AbrahamSilberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, 5thEdition, TMH(UNIT - I, II).
2.Alexis Leon, Mathews Leon, Fundamentals of Database Management Systems, Vijay Nicole Imprints Private Limited(UNIT – III).

ADVANCED LEARNERS COURSE

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ADVANCED LEARNERS COURSE		BLOCK CHAIN TECHNOLOGY	-	-	4

COURSE CONTENT

UNIT I FUNDAMENTALS OF BLOCKCHAIN

Fundamentals of Blockchain- Introduction- Origin of Blockchain- Blockchain Solution- Components of Blockchain- Block in a Blockchain- The Technology and the Future-Potential Applications in the Industry- Blockchain Types and Consensus Mechanism- Introduction- Decentralization and Distribution- Types of Blockchain- Consensus Protocol

UNIT II CRYPTOCURRENCY – BITCOIN, ALTCOIN AND TOKEN

Cryptocurrency – Bitcoin, Altcoin and Token- Introduction- Bitcoin and the Cryptocurrency- Cryptocurrency Basics- Types of Cryptocurrency- Cryptocurrency Usage Public Blockchain System- Introduction- Public Blockchain- Popular Public Blockchains- The Bitcoin Blockchain- Ethereum Blockchain

UNIT III SMART CONTRACTS

Smart Contracts- Introduction- Smart Contract- Characteristics of a Smart Contract- Types of Smart Contracts- Types of Oracles- Smart Contracts in Ethereum- Smart Contracts in Industry- Private Blockchain System- Introduction - Key Characteristics of Private Blockchain- Why We Need Private Blockchain- Private Blockchain Examples- Private Blockchain and Open Source- E-commerce Site Example-State Machine

UNIT IV CONSORTIUM BLOCKCHAIN

Consortium Blockchain- Introduction- Key Characteristics of Consortium Blockchain- Why We Need Consortium Blockchain- Hyperledger Platform- Overview of Ripple- Overview of Corda- Initial Coin Offering- Introduction- Blockchain Fundraising Methods- Launching an

ICO- Investing in an ICO- Pros and Cons of Initial Coin Offering- Successful Initial Coin Offerings- Evolution of ICO- Ico Platforms

UNIT V SECURITY IN BLOCKCHAIN

Security in Blockchain- Introduction- Security Aspects in Bitcoin- Security and Privacy Challenges of Blockchain in General- Performance and Scalability- Identity Management and Authentication Application of Blockchain- Introduction- Blockchain in Banking and Finance- Blockchain in Education- Blockchain in Energy- Blockchain in Healthcare- Blockchain in Real-estate- Blockchain in Supply Chain- The Blockchain and IoT

TEXTBOOK:

1. Chandramouli Subramanian,Asha A George Abhilash K A and Meena Karthikeyan, “Blockchain Technology”, Universities Press Private Limited

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ADVANCED LEARNERS COURSE		INTRODUCTION TO DATA COMPRESSION			4

COURSE CONTENT

UNIT I Introduction to Data Compression

Introduction- Compression Techniques- Modeling and Coding- Mathematical Preliminaries for Lossless Compression- Overview- A Brief Introduction to Information Theory- Models- Coding- Huffman Coding- Overview- The Huffman Coding Algorithm- Nonbinary Huffman Codes- Adaptive Huffman Coding- Golomb Codes- Rice Codes- Tunstall Codes- Applications of Huffman Coding

UNIT II Arithmetic Coding and Dictionary Techniques

Arithmetic Coding- Overview- Introduction- Coding a Sequence- Generating a Binary Code- Adaptive Arithmetic Coding-Binary Arithmetic Coding- Comparison of Huffman and Arithmetic Coding- Dictionary Techniques- Overview- Introduction- Static Dictionary- Adaptive Dictionary-Grammar Based Compression

UNIT III Context-Based Compression and Lossless Image Compression

Context-Based Compression- Overview- Introduction- Prediction with Partial Match (p*pm)*- The Burrows-Wheeler Transform- Associative Coder of Buyanovsky (ACB)- Dynamic Markov Compression-Lossless Image Compression- Overview- Introduction- CALIC- JPEG-LS-Prediction using Conditional Averages-Multiresolution Approaches- Lossless Image Compression Formats-Facsimile Encoding

UNIT IV Mathematical Preliminaries for Lossy Coding and Scalar Quantization

Mathematical Preliminaries for Lossy Coding- Overview- Introduction- Distortion Criteria- Information Theory Revisited-Rate Distortion Theory- Models- Scalar Quantization- Overview- Introduction-The Quantization Problem-Uniform Quantizer-Adaptive Quantization-Nonuniform Quantization-Entropy-Coded Quantization

UNIT V Vector Quantization and Differential Encoding

Vector Quantization- Overview- Introduction-Advantages of Vector Quantization over Scalar Quantization- The Linde-Buzo-Gray Algorithm- Tree-Structured Vector Quantizers- Structured Vector Quantizers- Variations on the Theme- Trellis-Coded Quantization- Differential Encoding- Overview- Introduction-The Basic Algorithm-Prediction in DPCM-Adaptive DPCM-Delta Modulation-Speech Coding-Image Coding

TEXTBOOK:

1. KHALID SAYOOD, "Introduction to Data Compression", Elsevier Relx India Pvt Limited, Fifth Edition

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ADVANCED LEARNERS COURSE		GREEN MARKETING MANAGEMENT			4

COURSE CONTENT

UNIT I Introduction

Introduction: An Overview of Green Marketing - An Overview of Strategic Planning. The Consumption-Environment Interface:The Environment and Consumption. - The Environment Effects on Consumption.

UNIT II Providing Value Via Sustainable Marketing Strategies

Providing Value via Sustainable Marketing Strategies: Discovering Value via Market Analysis – Communicating Value via Integrated Marketing Programs - Producing Value via Innovation.

UNIT III Delivering Value Via Sustainable Supply Cycle Strategies

Delivering Value via Sustainable Supply Cycle Strategies – Delivering Value in Retailing – Proclaiming Value via Sustainable Pricing Strategies.

UNIT IV Macroeconomic Energy Consumption

Macroeconomic Energy Consumption: The Role of Household Consumption – Energy Consumption in the Services Sector- Energy Consumption in the Transportation Sector - The Role of Industrial Consumption.

UNIT V Green Marketing and Sustainability Reporting

Green Marketing And Sustainability Reporting: Reporting value to Stake Holders.

TEXT BOOK:

Green Marketing Management, Robert Dahlstrom, Cengage Learning India Private Limited.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ADVANCED LEARNERS COURSE		MOBILE COMMERCE			4

COURSE CONTENT

UNIT I Introduction to Mobile Commerce

Definition, Scope of Mobile Commerce, Benefits & Limitations of M- Commerce, M-Commerce Framework, M-commerce business models, E-commerce Vs M-Commerce. Impact of M-Commerce, Mobile Portal, Types of M-Commerce Services, Application of Mobile Commerce in Industry

UNIT II Wireless Mobile Communication & Digital Cellular Technology

Wireless Communication, Satellite Communication, Mobile Communication Systems, Cellular Communication, Cellular Networks, Mobile Phone cellular Systems

UNIT III Mobile Devices and Mobile Service Providers

Types of mobile Devices, Mobile Computers, Mobile Internet Device, Personal Navigation Device, Mobile Nerwork Operators. Mobile Virtual Network Operators, MOBILE BANKING : Services & Technologies of Mobile Banking, Advantages & Challenges of Mobile Banking, Mobile Banking Applications

UNIT IV Mobile Payment and Mobile Computing

Mobile Payment, Characteristics of Mobile Payment Systems, Mobile Payment Models, Types of Mobile Payments, Mobile Payments Service Providers, Applications of Mobile Computing, Challenges of Mobile Computing, Mobile Computing Software Platforms, Future of Mobile Computing

UNIT V Security and Privacy Issues Legal Aspects

Mobile Security Concepts, Mobile Security Mechanism, Mobile Network Security, Mobile Information Security, Mobile Device Related Laws, Cell Phone Freedom Act 2010, Information Technology Act 2000 of India, Privacy and Electronic Communication Regulations Act 2003, FUTURE OF MOBILE COMMERCE : Future of Mobile Commerce, Mobile Fraud Detection

TEXT BOOK:

1. Mobile Commerce, Karabi Bandyopadhyay, PHI Learning Pvt. Limited, EEE, 2013.