A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS)

(Accredited With 'A' Grade By NAAC 3rd Cycle)

(Affiliated to Bharathidasan University, Tiruchirappalli)

NAGAPATTINAM – 611 001

PG DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS

BCA

(2021-2024 Batch)

A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM

UG Programme - B.Sc Computer Science

(For the candidates admitted from 2019 – 2020 onwards)

Bloom's Taxonomy Based Assessment Pattern

Knowledge Level

K1 – Acquire/Remember	**K2** – Understanding	**K3** – Apply	**K4** – Analyze	**K5** – Evaluate	**K6** – Create

Part I, II and III

Theory (External + Internal = 75 + 25 = 100 marks)

External/Internal					
Knowledge Level	**Section**	**Marks**	**Exam Hours**	**Total**	**Passing Mark**
K1-K3	A (Answer all)	10 ×2 = 20	3	75	30
K3-K6	B (Either or pattern)	5 × 5 = 25			
K3-K6	C (Answer 3 out of 5)	3 × 10 = 30			
PRACTICAL (External + Internal = 60 + 40 = 100 marks)			3	60	24
K1-K6	Answer all Questions	2 ×25=50 Record =10			

PG DEPARTMENT OF COMPUTER SCIENCE

B.C.A COURSE STRUCTURE UNDER CBCS

(2021-2024 Batch)

OBE ELEMENTS

Programme Educational Objectives (PEO):

PEO 1:	To impart knowledge in advanced concepts and applications in different fields of computer Science.
PEO 2:	To prepare students to enter into professional courses.
PEO 3:	To educate students to occupy important positions in Software's, MNCs and Industries
PEO 4:	To equip students with skills to excel in their future careers. To enable students to take up challenging jobs.
PEO 5:	To prepare students to enter Masters Programme like M.Sc.,(Computer Science),M.Sc., (Information Technology) and pursue professional programmes like M.C.A. etc.

Programme Outcomes (PO):

On completion of the course the learner will be able

PO 1:	Academic Excellence: Academic excellence through effective delivery of course contents. Goal-Oriented and Life-Long Education: Setting short term, medium, and long term goals and achieving them in a global competitive perspective.
PO 2:	Social Consciousness : Develop committed and socially responsible individuals and help them take up active and positive roles in society
PO 3:	Technical Knowledge: To find, utilize and create content using information technologies and the internet.
PO 4:	Entrepreneurial Development: They would develop business acumen, analytical skills, financial literacy necessary to appreciate the dynamic nature of commerce and industry
PO 5:	Research and practical knowledge: Using research knowledge and aptitude acquired in the course of study for solving problems and face modern day challenges. Project Work and Viva: To help them develop the ability to participate in academic discussions.

Programme Specific Outcomes (PSO):

On completion of the course the learner will be able

PSO 1:	Acquire skill and information not only about computer and information technology but also in organization and management. Prepare student for roles pertaining to computer applications and IT industry
PSO 2:	Develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT
PSO 3:	Learn programming language such as Java, C++, HTML, SQL, Dotnet, etc… Prepare the learners to get placed in reputed organisations
PSO 4:	Provide information about various computer applications and latest development in IT and communication system
PSO 5:	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B.C.A., 2021- 2024 Batch
STRUCTURE OF THE PROGRAMME

Part	Title of the part	No. of Courses		Credit
I	LC- Language Course	4	24	12
II	ELC – English Language Course	4	24	12
III	CC- Core Course	15	71	63
	AC –Allied Course	6	27	18
	MBE - Major Based Elective	03	17	17
IV	NME - Non- Major Elective	2	4	6
	SBE - Skill Based Elective	3	6	4
	SSD – Soft Skill Development	1	2	2
V	ES - Environmental Studies	1	2	2
	VE - Value Education	1	2	2
	EA - Extension Activities	-	-	1
	GS - Gender Studies	1	1	1
	Total	**41**	**180**	**140**

Note:

1. Activities undertaken apart from the working
2. Other than working will be scheduled on Saturdays with special time table

* Extra Credit Courses:

Year	Semester	Title of the Paper
I	I	Computer Literacy – I
	II	Computer Literacy - II

Passing Minimum

A candidate shall be declared to have passed in each course if she secures not less than 40% marks out of 75 marks (i.e., 30 marks) in the End Semester Examination (SE) and 40% out of 25 marks (i.e., 10 marks) in the Continuous Internal Assessment.(CIA).

B.C.A., 2021- 2024 Batch
SCHEME OF THE PROGRAMME

Sem.	Part	Course Code	Course	Ins. Hrs.	Credit	Exam	Marks		Total Marks
							CIA	SE	
I	I	LCTA	LC- Language Course Tami I / French- I /Arabic- I /Hindi- I	6	3	3	25	75	100
	II	LCEA	ELC – English Language Course I	6	3	3	25	75	100
	III	KUA	CC- Core Course I C Programming	5	3	3	25	75	100
		KUBY	CC- Core Course II Programming in C lab	3	3	3	40	60	100
		KUCY	CC- Core Course III Office Automation Lab	2	2	3	40	60	100
		KUMA1	AC – First Allied Course I Mathematics I	6	3	3	25	75	100
	IV	VE	Value Education	2	2	3	25	75	100
			Total	**30**	**20**	*	*	*	**700**
II	I	LCTB	LC- Language Course Tamil-II /French=-II/Arabic-II / Hindi-II	6	3	3	25	75	100
	II	LCEB	ELC – English Language Course II	6	3	3	25	75	100
	III	KUD	CC - Core Course IV Object Oriented Programming Using C++ with Data Structures	4	4	3	25	75	100
		KUE	CC- Core Course V Data Structures using C++ Lab	4	3	3	40	60	100
		KUA2	AC - First Allied Course II Elements of Accounting	4	3	3	25	75	100
		KUMA3	AC - First Allied Course III Mathematics II	4	3	3	25	75	100
	IV	ES	Environmental Studies	2	2	3	25	75	100
			Total	**30**	**20**	*	*	*	**700**

III	I	LCTC	LC- Language Course Tamil-III/French-III/Arabic-III/ Hindi-III	6	3	3	25	75	100
	II	LECE	ELC – English Language Course III	6	3	3	25	75	100
	III	KUF	CC - Core Course VI Java Programming	6	5	3	25	75	100
		KUGY	CC - Core Course VII Java Programming Lab	4	3	3	40	60	100
		KUMA4	AC –Second Allied Course I Mathematics - III	6	3	3	25	75	100
	IV	KUE1Y	NME -Non Major Elective I 1. Multimedia Lab 2. PC Package Lab	2	2	3	40	60	100
			Total	**30**	**19**	*	*	*	**600**
IV	I	LCTD	LC- Language Course Tamil-IV/French-IV/Arabic-IV/ Hindi-IV	6	3	3	25	75	100
	II	LCED	ELC – English Language Course IV	6	3	3	25	75	100
	III	KUH	CC - Core Course VIII Database Systems	4	3	3	25	75	100
		KUIY	CC - Core Course IX Database Systems Lab	3	2	3	40	60	100
		KUA5	AC - Second Allied Course II Financial Management	4	3	3	25	75	100
		KUA6Y	AC - Second Allied Course III Tally Lab	3	3	3	40	60	100
	IV	KUS1Y	NME - Non Major Elective II 1.**HTML Lab** 2. Internet Lab	2	2	3	40	60	100
	V	KUE2Y	SBE – Skill- Based Elective I 1. **R Programming Lab** **2.** Web Application Development Lab	2	2	3	40	60	100
			Internship / Fieldwork (30)	-	2	-	-	-	Grade
			Total	**30**	**23**	*	*	*	**800**

V	III	KUJ	CC - Core Course X Computer Networks	6	5	3	25	75	100
		KUK	CC- Core Course XI Python Programming	6	6	3	25	75	100
		KUL	CC - Core Course XII Software Engineering	6	6	3	25	75	100
		KUE3	MBE –Major Based Elective I **1.Mobile Computing** 2.Big Data and Analytics 3.Artificial Intelligence	6	6	3	25	75	100
	IV	KUS2Y	SBE –Skill Based Elective II **1.Python and Bioinformatics Lab** 2.Open Source Product Lab	2	2	3	40	60	100
		KUS3Y	SBE – Skill Based Elective III **1. Android Lab** 2. Multimedia Lab	2	2	3	40	60	100
		SSD	Soft Skills Development	2	2	3	25	75	100
			Total	**30**	**29**	*	*	*	**700**
VI	III	KUM	CC- Core Course – XIII Operating System	6	6	3	25	75	100
		KUN	CC- Core Course – XIV Web Technology	6	5	3	25	75	100
		KUOP	CC - Core Course – XV Project	6	5	3	40	60	100
		KUE4	MBE – Major Based Elective II **1. Computer Graphics** 2. Cyber Security 3. Ecommerce	6	6	3	25	75	100
		KUE5Y	MBE – Major Based Elective III **1. Web Technology and Bioinformatics Lab** 2. UI/UX Design and Animation Lab using Open Source Tools 3. Software Testing Tools Lab	5	5	3	40	60	100
	V		EA - Extension Activities	-	1	-	-	-	Grade
		GS	GS - Gender Studies	1	1	3	25	75	100
			Total	**30**	**29**				**600**
Grand Total				**180**	**140**				**4100**

Semester-I / Core Course-I(CC)	C PROGRAMMING	Course Code: KUA
Instruction : 5	Credits: 3	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To obtain Cognitive about the structure of the programming language C • To develop the program writing and logical thinking skill. • To impart the Cognitive about pointers which is the backbone of effective memory handling • To study the advantages of user defined data type which provides flexibility for application development • To teach the basics of Preprocessors available with C compiler	
UNIT	**CONTENT**	**HOURS**
I	**FUNDAMENTALS OF PROGRAMMING** Computer Basics- Algorithms – Simple Model of a Computer – Characteristics of Computers-Problem Solving Using Computers – Flow Chart – The Working of a Computer. **INTRODUCTION TO C LANGUAGE**: Identifiers, Keywords, Constants, Variables and data types, Access Modifiers, Data Type Conversions- Operators- Conditional Controls - Loop Controls.	12
II	**ARRAYS:** One Dimensional Array - Two Dimensional Array – Character Arrays and Strings. **FUNCTION:** Introduction - Elements of User Defined Function - Definition of Functions - Return Values and their Types – Function Calls - Function Declaration - Category of Function - Nesting of Function - Recursion - Passing Arrays to Function - Passing Strings to Function – The Scope, Visibility and Lifetime of Variables - Library functions.	12
III	**STRUCTURES AND UNIONS** Defining Structure - Declaring Structure Variable - Accessing Structure Members - Structure Initialization - Arrays of Structure - Arrays within Structures -	12

	Structures within Structures - Structures and Function - Union.	
IV	**POINTERS** Pointers - Declaration of Pointers - Accessing Variables through Pointers - Chain of Pointers - Pointer Expressions- Pointer Increments - Pointers with Arrays, Strings- Array of Pointers - Pointers with Functions - Pointers with Structures.	12
V	**FILE MANAGEMENT IN C** Defining and Opening a File - Closing a File - Input / Output Operations on Files - Error Handling During I/O Operations - Random Access to Files - Command Line Arguments - Dynamic Memory Allocation.	12
VI	Contemporary Issues: Problem Solving through C Programming - Edureka	-

Text Books:

1. V. Rajaraman, "Fundamentals of Computer ",Asoke k.Ghosh Publications, PHI Course Limited, 7th Ed., New Delhi,2011. UNIT I(A)
2. E. Balagurusamy, "Programming in C", Tata McGraw Hill, 8th Ed., New Delhi, 2016. UNIT I (B) to UNIT V.

Reference Books:

1. Byron S. Gottfried, "Programming with C", Tata McGraw Hill, 3rd Ed., New Delhi, 2010.
2. Yashvant Kanetkar, "Working with C", BPB Publication, New Delhi, 2008.

Web Resources:

https://www.w3schools.in/c-tutorial/
https://nptel.ac.in/courses/106104128/

Course Outcomes:

On completion of the course the learner will be able to

CO1: Understand the basic terminology of algorithm, flowchart and gain awareness used in compu programming.

CO2: Design programs involving the various concepts like decision structures, loops, functions o language.

CO3: Demonstrate the single, multi-dimensional arrays, String functions and user defined functions

CO4: Compare the structure and union of C and apply it to construct array of structures and struct function.

CO5: Understand the dynamics of memory by the use of pointers and pointers with functions.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-I / Core Course-II(CC)	PROGRAMMING IN C LAB	Course Code: KUBY
Instruction : 3	Credits: 3	Exam : 3
Internal Marks -40	External Marks-60	Total Marks: 100

Course Objectives:

- To develop skills in implementing algorithms through the programming Language C
- To explore the features of C by applying sample problems.
- The students will be able to enhance their analyzing and problem solving skills
- To learn problem solving techniques.
- To teach the student to write programs in C and to solve the problems.

List of Practical's:

1. a) Program to find Simple Interest.
   b) Program to calculate area of rectangle, square and triangle.
   c) Program to find whether the given number is odd or even.
2. a) Program to find the roots of a quadratic equation using if … else statement.
   b) Program to find the biggest of 3 given numbers using nested if … else statement.
3. a) Program to find sum of individual digits of a given number using while statement.
   b) Program to find the sum of odd numbers between 1 and 100 using do … while statement.
   c) Program to find the sum and average of the given 'n' numbers using for loop.
4. a) Program to find the factorial of the given number using recursive function.
   b) Program to calculate the binomial coefficient.
5. a) Program to sort the given set of numbers.
   b) Program to perform the addition of two given matrices.
   c) Program to perform the multiplication of two given matrices.
6. a) Program to check whether the given string is palindrome or not.
   b) Program to arrange the given set of names in alphabetical order.
7. a) Program to illustrate the use of pointers in arithmetic operations.
   b) Program to compute the sum of all elements stored in an array using pointers.
   c) Program to swap the two values using pointers.
8. Program to prepare mark sheet using array.

Course Outcomes

On completion of the course the learner will be able to

CO1: Understanding a functional hierarchical code organization.

CO2: Ability to define and manage data based on problem subject domain.

CO3: Ability to work with textual information, characters and strings.

CO4: Ability to work with arrays of complex objects.

CO5: Understanding a concept within the framework of functional model.

Mapping of Cos with Pos & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-I / Core Course-III(CC)	OFFICE AUTOMATION LAB	Course Code: KUCY
Instruction : 2	Credits: 2	Exam : 3
Internal Marks -40	External Marks-60	Total Marks: 100

Course Objectives:

- Office tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- Give students an in-depth understanding of why computers are essential components in business, education and society.
- Provide foundational or "computer literacy" curriculum that prepares students for life-long learning of computer concepts and skills.
- To acquire knowledge on editor, spread sheet and presentation software.
- To train them to work on the comment based activities in MS-office system

List of Practical's:

MS-WORD

1. Text Manipulation – Change the font size and type, Aligning and Justification of text, Underlining the text, indenting the text
   a) Prepare a Bio-data
   b) Prepare a letter
2. Using Bullets and Numbering in Paragraphs, Footer and Header, Finding and Replacing Text and Checking Spelling
   a) Prepare any document
   b) Prepare any document in newspaper format
3. Tables and Manipulations – Creation, Insertion and Deletion (Rows and Columns) and Usage of Auto Format
   a) Create a Mark sheet and find total mark, average and result
   b) Create a calendar and Auto Format it.
4. Picture Insertion and Alignment - Prepare a handout
5. Using Mail Merge
   a) Prepare a business letter
   b) Prepare an invitation

MS-EXCEL

1. Usage of Formulae and Built-in Functions.
2. Editing Cells and Using Commands and Functions
3. Moving and Copying, Inserting and Deleting Rows and Columns
4. Paybill Preparation

MS-POWERPOINT

Preparation and Manipulation of Slides

Course Outcomes:

On completion of the Course, the learner will be able

CO1: To perform documentation activities
CO2: To execute accounting operations
CO3: To enhance presentation skills
CO4: Generate simple and effective tables and graphs to describe experimental data.
CO5: Properly format and organize a formal laboratory report.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-I	VALUE EDUCATION	Course Code: VE
Instruction : 2	Credits: 2	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To develop good moral values in the children. • To develop thinking in a better aspect and a democratic way of living. • To develop good citizenship and standard of living and behavior of children. • To develop tolerance and make a kind person to the children**.** • To teach and inculcate the essential qualities to become a good leader	
UNIT	**CONTENT**	**HOURS**
I	**Philosophy of Life and Social Values** Human Life on Earth (Kural 629) Purpose of Life (Kural 46) Meaning and Philosophy of Life (Kural 131, 226) Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself(b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).	6
II	**Human Rights and Organisations** Definitions, Nature of Human Rights. Universal Declaration of Human Rights, International covenent on Civil and Political Rights - International covenent of Economic, Social and Cultural Rights. Amnesty International Red Cross.	6
III	**Human Rights : Contemporary Challenges** Child labour - Womens Right - Bonded labour - Problems of refugees - Capital punishment. National and State Human Rights Commissions	6
IV	**Yoga and Health** Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.	6
V	**Role of State Public Service Commission** Constitutional provisions and formation - Powers and Functions - Methods of recruitment - Rules and notification, syllabi for different exams - written and oral - placement.	6

REFERENCE BOOK

1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, SerfojiNagar, Medical College Road, Thanjavur 613 004.
2. Leah Levin, Human Rights, NBT, 1998
3. V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures.
4. Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministryof Health, New Delhi.
5. SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications,Sedaptti, 1999.

Course Outcomes:

Learner will understand the importance of value based living.

CO1:Students will gain deeper understanding about the purpose of their life.
CO2:Students will understand and start applying the essential steps to become good leaders.
CO3:Students will emerge as responsible citizens with clear conviction to practice values andethics in life.
CO4:Students will become value based professionals.
CO5:Students will contribute in building a healthy nation

Mapping of Cos with Pos & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-II / Core Course-IV(CC)	**OBJECT ORIENTED PROGRAMMING USING C++ WITH DATA STRUCTURES**	**Course Code: KUD**
Instruction : 4	**Credits: 4**	**Exam : 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create
Course Objectives	• To give the concepts of object oriented programming and to impart the programming skills inC++. • Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. • Understand dynamic memory management techniques • Classify inheritance with the understanding of early and late binding, usage of exceptionhandling, generic programming. • Demonstrate the use of various OOPS concepts with the help of programs

UNIT	CONTENT	HOURS
I	**ABSTRACTION & OVERLOADING :** Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.	12
II	**INHERITANCE & POLYMORPHISM:** Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors	12

	– Dynamic Binding.	
III	**LINEAR DATA STRUCTURES:** Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists –Polynomial Manipulation - Stack ADT – Queue ADT - Evaluating arithmetic expressions.	12
IV	**NON-LINEAR DATA STRUCTURES:** Trees – Binary Trees – Binary tree representation and traversals – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search - Connected components.	12
V	**SORTING and SEARCHING:** Sorting algorithms: Insertion sort - Quick sort - Merge sort - Searching: Linear search –Binary Search.	12
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", TMG, 8th Ed., New Delhi, 2017.
2. Seymour Lipschutz, "Data Structures", Tata McGraw Hill Publishing Company Limited, 5th Ed., New Delhi, 2014. UNITS: III, IV & V.

Reference Books:

1. Robert Lafore, "Object Oriented Programming in Microsoft C++", Galgotia Publications, New Delhi, 2000.
2. Bjarne Stroustrup, "The C++ Programming Language", Addison- Wesley, 4th ed., 2013

Web Resources:

https://www.w3schools.com/cpp/
http://nptelvideos.com/video.php?id=2187&c=28

Course Outcomes:

On completion of the Course, the learner will be able to

CO1:Learn the basic concepts in Object-Oriented programming.

CO2:Develop programming skills by applying Object-Oriented programming.

CO3:Discuss the function overloading and Member Functions.

CO4:Understand the concepts of Constructors and Inheritance.

CO5:An Ability to incorporate Exception Handling in Object-Oriented programs and analyze File Input/output Streams.

Mapping of Cos with Pos & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-II / Core Course-V(CC)	**DATA STRUCTURES USING C++ LAB**	**Course Code: KUE**
Instruction : 4	**Credits: 3**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To understand the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand how to produce object-oriented software using C++
- To familiarize the students with language environment.
- To implement various concepts related to language.
- Be able to understand the difference between object oriented programming and procedural oriented language and data types in C++.

List of Practical's:

1. a) Program to find factorial of a given number.
   b) Program to convert dollars to rupees.
2. Program to illustrate the call by value and call by reference
3. a) Program to find the largest of three numbers using inline function.
   b) Program to find mean of 'N' numbers using friend function.
4. Program to find volume of cube, cylinder and rectangular box using function overloading.
5. Matrix Addition and Multiplication operations
6. To find an element using Sequential and binary search.
7. Perform the following types of Sorting:
   i. Bubble sort
   ii. Insertion sort
   iii. Selection sort
8. To PUSH and POP an element from STACK
9. To Insert and Delete an element from QUEUE.
10. To insert and delete a node in a linked list.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1:After the completion of this course, the students will be able to develop applications.
CO2:Describe the procedural and object oriented paradigm with concepts of streams, classes,functions, data and objects.
CO3:Understand dynamic memory management techniques using pointers, constructors, destructors, etc

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-II / I Allied Course – II (AC)	ELEMENTS OF ACCOUNTING	Course Code: KUA2
Instruction : 4	Credits: 3	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To provide the basic knowledge of the financial accounting including double entry book keeping. • Preparation of journal subsidiary book ledger trail balance and balance sheet. • To introduce students to Accounting, stressing its importance in today's business world. • To help students understand the main concepts and principles of Accounting. • To provide students with a theoretical basis upon which they will develop their knowledge in other areas of accounting.	
UNIT	**CONTENT**	**HOURS**
I	**ACCOUNTING AND BOOK KEEPING** Meaning of Accounting and Book keeping - Objectives – Accounting Concepts and Conventions – Principles of Double Entry – Kinds of Account – Journal and Ledger Accounts.	12
II	**SUBSIDIARY BOOKS** Purchases Book, Sales Book, Purchase Returns Book, Sales Returns, Bills Receivable Book, Bills Payable Book, Petty Cash Book and Journal Proper –Cash Book – Single Column only.	12
III	**TRAIL BALANCE** Trail Balance – Rectification of Errors – Suspense Account – Bank Reconciliation Statement.	12
IV	**FINAL ACCOUNTS** Final Accounts – Trading Account, Profit and Loss Account , Balance Sheet – Opening, Adjusting and Closing Entries.	12
V	**DEPRECIATION AND PROVISIONS** Depreciation and Provisions - Methods of Depreciation - Straight Line	12

	Method and Diminishing Balance Method .	
VI	Contemporary Issues : Expert lectures, online seminars – webinars	-

Text Book

T.S.Reddy & Dr.A.Murthy, Financial Accounting Marghum Publications-2015.

Reference Books

1. Advanced Accountancy by Shukla and Grewal
2. Advanced Accountancy by R.L. Gupta and Radhaswamy

Web Resources:

https://www.tutorialspoint.com/accounting_basics/cost_accounting_elements_of_cost.html

http://www.ddegjust.ac.in/studymaterial/bba/bba-104.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Preparing financial statements in accordance with appropriate standards.

CO2: Prepare ledger accounts using double entry bookkeeping and record journal entries accordingly.

CO3: Interpreting the business implications of financial statement information

CO4: Communicating complex ideas in writing and through oral presentations

CO5: Working effectively in diverse team settings. Effectively coordinating and motivating a group to achieve its best output

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-II	ENVIRONMENTAL STUDIES	Course Code: ES
Instruction : 2	Credits: 2	Exam : 3
Internal Marks -40	External Marks-60	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To develop a world population that is aware of and concerned about the environment and its associated problems • To develop the Cognitive • To ensure the Skills and attitudes • To develop motivations • Develop commitment to work individually and collectively towards solutions of current problems and prevention	
UNIT	**CONTENT**	**HOURS**
I	The Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness.	2
II	**Natural Resources**: Renewable and non-renewable resources: Natural resources and associated problems. a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e)	6

	Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	
III	Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers Energy flow in the ecosystem Ecological succession. Food chains, food webs and ecological pyramids Introduction, types, characteristic features, structure and function of the following ecosystem:- a.Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)	8
IV	Biodiversity and its conservation Introduction – Definition : Genetic, species and ecosystem diversity Bio geographical classification of India Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National and local levels India as a mega-diversity nation Hot-spots of biodiversity Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity	6
V	Environmental Pollution Definition Causes, effects and control measures of : a. Air Pollution b. Water Pollution c. Soil Pollution d. Marine Pollution e. Noise pollution f. Thermal Pollution g. Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution Pollution case studies Disaster management: floods, earthquake, cyclone and landslides. Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety	8

VI	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. Case studies Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation Public awareness.	7
VII	Human Population and the Environment Population growth, variation among nations. Population explosion – Family Welfare Programmes Environment and human health Human Rights - Value Education HIV/ AIDS - Women and	7
VIII	Child Welfare Role of Information Technology in Environment and human health .Case studies. Field Work Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain	-

Reference Books

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad –380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)

10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. CambridgeUniversity Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub.House, Delhi 284 p.
12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. PvtLtd 345 p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.

Web Resources:

http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf.

Course Outcomes:

On completion of the Course, learner should be able to

CO1: Understand key concepts from economic, political, and social analysis as they pertain tothe design and evaluation of environmental policies and institutions.

CO2: Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.

CO3: Appreciate the ethical, cross-cultural, and historical context of environmental issues andthe links between human and natural systems.

CO4: Reflect critically about their roles and identities as citizens, consumers and environmentalactors in a complex, interconnected world.

CO5: Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.

Mapping of Cos with Pos & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-III / Core Course-VI(CC)	**JAVA PROGRAMMING**	**Course Code: KUF**
Instruction : 6	**Credits: 5**	**Exam : 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To understand the concepts and features of object oriented programming • To examine key aspects of java Standard API library such as util, io, applets, swings, GUI based controls. • Knowledge of object-oriented paradigm in the Java programming language. • To learn java's exception handling mechanism, multithreading, packages and interfaces. • To develop skills in internet programming using applets and swings.	
UNIT	**CONTENT**	**HOURS**
I	**Fundamentals of Object-Oriented Programming**: Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. Java Evolution: History – Features. Overview of Java: simple Java program –Structure – Java Tokens – Java Virtual Machine.	18
II	**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 –Labelled loops. Classes, Objects and Methods.	18
III	Arrays, Strings – Interfaces: Multiple Inheritance – Packages: Putting	18

	Classes together – Multithreaded Programming.	
IV	Managing Errors and Exceptions – Applet Programming: Introduction- How Applet differ from Applications –preparing to write Applets – Building Applet code.	18
V	**Graphics Programming**: Managing Input/output Files in Java: Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions –Creation of files – Reading / Writing characters, Byte-Handling Primitive data Types – Random Access Files.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book

PROGRAMMING WITH JAVA – A PRIMER, E. Balagurusamy, TMH, 7th Edition, 2015.

Reference Books

1. The complete reference java 2, Patrick Naughton & Hebert Schildt, TMH 5th edition, 2011.
2. Programming with java, John R.Hubbard, TMH, 2nd edition.

Web Resources:

http://www.math.hcmuns.edu.vn/~hvthao/courses/java_programming/lecture_notes/

https://mrcet.com/downloads/digital_notes/CSE/II%20Year/JAVA%20PROGRAMMING_19.11 .2018.pdf

http://www.crectirupati.com/sites/default/files/lecture_notes/PRKJAVA-1.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Read and understand Java-based software code of medium-to-high complexity. Use standard and third party Java's API's when writing applications.

CO2: Understand the basic principles of creating Java applications with graphical user interface (GUI).

CO3: Create rich user-interface applications using modern API.

CO4: Understand the structure of the computational process, algorithms and complexity of computation.

CO5: Understand the basic approaches to the design of software applications. Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-III / Core Course-VII (CC)	**JAVA PROGRAMMING LAB**	**Course Code: KUGY**
Instruction : 4	**Credits: 3**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- To build software development skills using java programming for real world applications.
- To implement frontend and backend of an application
- To implement classical problems using java programming.
- The use of Java in a variety of technologies and on different platforms.

List of Practical's:

1. Write simple programs to demonstrate
   a) The various forms of inputs in Java
   b) Operators and expressions
   c) Control statements
2. Write a Java Program to define a class, describe its constructor, and instantiate its Object
3. Write a Java Program to demonstrate method overloading
4. Write a Java Program to demonstrate single and two Dimensional arrays.
5. Write a Java program to demonstrate various methods in the String and StringBufferclass.
6. Write a Java Program to demonstrate methods in the Vector class.
7. Write a Java Program to implement single inheritance
8. Write a Java Program to implement multiple inheritance
9. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
10. Write a Java program to implement the concept of threading by using Thread class and Runnable interface.
11. Write a Java program to implement the concept of Exception Handling.
12. Write a Java program using Applet

a) To display a message.

b) for passing parameters.

13. Write a Java programs for using Graphics class to display basic shapes and fill them and set background and foreground colors.

14. Write a Java program to demonstrate use of I/O streams.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
CO2: Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
CO3: Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
CO4: Demonstrate understanding and use of different exception handling mechanisms.
CO5: To understand the concept of multithreading for robust faster and efficient application development.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-III / Non-Major Elective I (NME)	**MULTIMEDIA LAB**	**Course Code: KUE1Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To Impart Practical Training in Computer Graphics and Animation related problems.
- To implement various graphics drawing algorithms, 2D-3D transformations and clipping
- techniques.
- Describe and evaluate the eight major classical types of animation
- Identify modern day examples for each classical animation type.
- Emphasis on creating movement and expression utilizing traditional or electronically generated image sequences.

List of Practical's:

Photoshop:

1. (i) Handling different file formats and interchanging them, changing the resolution, color, grayscales and size of the images
   (ii) Using brushes and creating multicolor real life images
2. Cropping, rotating, overlapping, superimposing, pasting photos on a page
3. Creation of a single image from selected portions of many
4. Developing a commercial brochure with background tints
5. Creating an image with multi-layers of images and texts.
6. Applying masks and filtering on images

Flash:

Develop an image(s) and do the following.

1. Basic Drawing and Painting
2. Working with Strokes and Fills
3. Creating Custom Colors, Gradients, and Line Styles Transforming and Grouping Objects
4. Creating and Managing Multiple Layers
5. Converting Text into Shapes
6. Animate using motion, shape, Tweening, and actions

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Communicate ideas, believable action and emotion effectively by employing principles animation and performance in all aspects of drawing.
CO2: Integrate the concepts, principles and theories involved in the physics of animation in all aspects of drawing.
CO3: Design layouts and backgrounds that incorporate principles of composition, perspective and colour, with speed, accuracy and dexterity, using a variety of media.

Semester-III / Non-Major Elective I (NME)	**PC PACKAGE LAB**	**Course Code: KUE1Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Office tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- Give students an in-depth understanding of why computers are essential components in business, education and society.
- Provide foundational or "computer literacy" curriculum that prepares students for life-long learning of computer concepts and skills.
- To acquire knowledge on editor, spread sheet and presentation software.
- To train them to work on the comment based activities in MS-office system

MS-WORD

1. Text Manipulation – Change the font size and type, Aligning and Justification of text, Underlining the text, indenting the text
   a) Prepare a Bio-data
   b) Prepare a letter
2. Using Bullets and Numbering in Paragraphs, Footer and Header, Finding and Replacing Text and Checking Spelling
   a) Prepare any document
   b) Prepare any document in newspaper format
3. Tables and Manipulations – Creation, Insertion and Deletion (Rows and Columns) and Usage of Auto Format
   a) Create a Mark sheet and find total mark, average and result
   b) Create a calendar and Auto Format it.
4. Picture Insertion and Alignment - Prepare a handout
5. Using Mail Merge
   a) Prepare a business letter
   b) Prepare an invitation

MS-EXCEL

1. Usage of Formulae and Built-in Functions.
2. Editing Cells and Using Commands and Functions
3. Moving and Copying, Inserting and Deleting Rows and Columns
4. Paybill Preparation

MS-POWERPOINT

Preparation and Manipulation of Slides

Course Outcomes:

On completion of the Course, the learner will be able

CO1: To perform documentation activities
CO2: To execute accounting operations
CO3: To enhance presentation skills
CO4: To work on Document Management Systems
CO5:Format Text, Paragraphs, and sections, and to Create and manage documents

Semester-IV / Core Course-VIII(CC)	DATABASE SYSTEMS	Course Code: KUH
Instruction : 4	Credits: 3	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Distinguish between data and information and Knowledge • Distinguish between file processing system and DBMS • Describe Database users including data base administrator • Describe data models, schemas and instances. • Describe DBMS Architecture & Data Independence.	
UNIT	**CONTENT**	**HOURS**
I	**INTRODUCTION** Database System Applications –Database Languages – Transaction Management – Database Architecture – Database users and Administrators - **Relational Model:** Structure of Relational Databases – Database Design – ER Model – The Entity-relationship Model – Constraints – Entity Relationship Diagrams.	12
II	**RELATIONAL ALGEBRA OPERATIONS** **Relational Languages**: The Tuple Relational Calculus – The Domain Relational Calculus – **SQL**: Background – Data Definition – Basic Structure of SQL Queries – Set Operations – Aggregate Functions – Null Values – Nested Sub-Queries – Views Modification of the Database.	12
III	**DATA NORMALIZATION** Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form –	12

	Third Normal Form – Boyce- Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – **Database Security**: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.	
IV	**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	12
V	**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.	12
VI	Contemporary Issues : Expert lectures, online seminars – webinars	-

Text Books:

1."Database System Concepts", Abraham Silberschatz, Henry F.Korth, .Sudarshan, TMH 6th Edition (Units - I, II,)

2."Fundamentals of Database Management Systems", Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited. (Unit – III)

3."Database Systems Using Oracle" Nilesh Shah, 2nd edition, PHI.UNIT-IV: Chapters 10 & 11 UNIT-V: Chapters 12, 13 & 14)

Reference Books :

Text Book of RDBMS (Relational Database Management Systerms)- By Mrs Vidya H. Bankar, Mrs DeepaShree K, Mehendale, Mrs Sujatha P. Patel

Web Resources:

http://www.svecw.edu.in/Docs%5CITIIBTechIISemLecDBMS.pdf

http://www.kciti.edu/wp-ontent/uploads/2017/07/dbms_tutorial.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Emphasize the need, role, importance and uses of databases in application development

CO2: Design E-R modeling for a given situation and provide the foundation for development of relational database structure.

CO3: Identify the advantages of the database approach over the file based data storage system. Distinguish between different models of file organizing, storing and using of data.

CO4: Understand the relational model and relational algebra operations and Normalize the relational tables applying normalization rules.

CO5: Apply PL/SQL procedural interfaces statement on relational tables as per requirements

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-IV / Core Course-IX(CC)	**DATABASE SYSTEMS LAB**	**Course Code: KUIY**
Instruction : 3	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To acquire knowledge on DDL,DML, and DCL commands and to understand the usage of SQL queries
- To learn the features on PL/SQL programming and Oracle forms
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

List of Practical's:

SQL:

1. Table Creation with various data types and constraints.
2. DLL statements (CREATE, ALTER, DROP).
3. DML statements (Retrieval, Update, Delete, Insertion).
4. Arithmetic Functions.
5. Character and String Functions.
6. Group Functions.
7. Conversation Functions.
8. Date Functions.
9. JOINS (Self, Equi and Outer).
10. Sub queries and correlated sub queries.

PL/SQL:

1. Control Structures.
2. Simple and multiple loop structures.
3. Exception Handling.

4. Explicit and Implicit Cursors.
5. Triggers

Forms/Report:

1. Employee Pay bill preparation.
2. Student mark sheet preparation.
3. Inventory Control Processing.

MY SQL

1. Design an authentication web page in PHP with MySQL to check username and password.
2. Write a program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Design and implement a database schema for a given problem-domain
Normalize a database

CO2: Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

CO3: Programming PL/SQL including stored procedures, stored functions, cursors, packages

CO4: Analyze and design a real database application.

CO5: Develop and evaluate a real database application using a database management system.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV / Second Allied Course – II (AC)	FINANCIAL MANAGEMENT	Course Code: KUA5
Instruction : 4	Credits: 3	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To help the students to develop cognizance of the importance of Financial Management in corporate valuation • To enable students to describe how people analyze the corporate leverage under different conditions and understand why people valuate different corporate in different manner. • To provide the students to analyze specific characteristics of Supply Chain Industry and their future action for cash flow • To enable students to synthesize related information and evaluate options for most logical and optimal solution such that they would be able to predict and control Debt Equity incurrence and improve results.	
UNIT	**CONTENT**	**HOURS**
I	**Accounting Principles and Concepts** Double entry book keeping- Income and expenditure- Accounting record and system- assets and liabilities- Depreciation, Depletion and Amortization - Accounting for depreciation.	12
II	Journal – Ledger- Trial Balance- Trading, Manufacturing and profit and Loss account – Balance sheet.	12
III	Analysis and interpretation of financial statements with ratios.	12
IV	Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost - Material Cost- Labour Cost – Overhead- fixed and variable cost- Cost volume – profit analysis - marginal costing and decision	12

	making.	
V	Budgeting and budgetary control – types of budgets- Preparation of various functional budgets- Preparations of cash budgets- flexible budgets- Advantages of Budgeting and Budgetary control.	12
VI	Contemporary Issues : Expert lectures, online seminars – webinars.	-

Text Books:

1. T.S. Grewal, "Double Entry Book Keeping", All India Sultan Chand (Recent Edition)
2. S.N. Maheswari "Principles of Management Accounting ", Sultan Chand, NewDelhi (Recent Edition)
3. Shukla, Grewal& Gupta, "Advanced Accounts "Sultan Chand Publications

Reference Books :

1. S.K. Gupta & R.K. Sharma- Practical Problems in Management Accounting (Recent edition)
2. Khan and Jain "Financial Management" Tata McGraw Hill (Recent Edition)

Web Resources:

http://www.crectirupati.com/sites/default/files/lecture_notes/finance%20notes.pdf

http://www.csun.edu/~zz1802/Finance%20303/Web-Stuff/Lecture-Notes-Mid1.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Preparing accounting information for planning and control and for the evaluation of finance.

CO2: Prepare Bank reconciliation statement from incomplete statement

CO3: Explain the purpose of double entry system

CO4: To understanding the accounting system properly.

CO5: Preparation of ratification errors.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV / Second Allied Course – III (AC)	**TALLY LAB**	**Course Code:KUA6Y**
Instruction : 3	**Credits: 3**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objective:

- To acquaint students with the accounting concept, tools and techniques influencing business organization
- Student will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software 3.
- Accounting with Tally certificate course is not just theoretical program, but it also includes continuous practice.
- To make students ready with required skill for employability in the job market.

List of Practical's:

1. Architecture and customization of Tally
2. Configuration of Tally
3. Tally Screens and Menus
4. Creation of new company and groups
5. Preparation of voucher entries.
    a. Payment voucher
    b. Receipt voucher
    c. Sales voucher
    d. Purchase voucher
    e. Contra voucher
    f. Journal voucher
6. Ledger Creation
7. Preparation of Trail balance

8. Preparation of Profit and loss statement.
9. Preparation of Balance Sheet.
10. Preparation of Bank Reconciliation Statement

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: At the end of the course student should be able to use accounting and business terminology.

CO2: The objective of financial reporting and related key accounting assumptions and principles.

CO3: Student will do by their own create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software

CO4: Students do possess required skill and can also be employed as Tally data entry operator.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-IV / Skill Based Course I	**R PROGRAMMING LAB**	**Course Code: KUS1Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objective:

- It is used to understand the concepts used to perform vector operations and matrix operations.
- It familiarizes the students with various statistics operations mean, median etc., are performed.
- To explore data from a variety of sources by building regression model and for generating charts, graphs, and other data representations.
- Explore and understand how to use the R documentation.
- Expand R by installing R packages.

List of Practical's:

1. R Program for Vector operations.
2. Create a R- list.
3. Implement matrices addition, subtraction and Multiplication.
4. Create a Data frame.
5. Create a factor object.
6. Import data, copy data from CSV file to R.
7. Create a R program for Mean median and mode.
8. Draw Bar charts and Pie charts in R.
9. Make visual representations of data for plotting functions in R.
10. Create a R program for Regression Model.

Course Outcomes

On completion of the Course, the learner will be able to

CO1: Understand the fundamental syntax of R through demonstrations and writing R code
CO2: Apply concepts such as data types, iteration, control structures, functions, and boolean operators using R
CO3: Able to import a variety of data formats into R using R Studio
CO4: Explore data-sets to perform appropriate statistical tests using R
CO5: Acquire skills to generate charts and graphs visualization

Semester-IV / Skill Based Course I	**WEB APPLICATION DEVELOPMENT TOOLS LAB**	**Course Code: KUS1Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Understand the concepts necessary to create Dynamic Web Applications
- Evaluate Several Alternatives in the Design of a Web Application.
- Develop A Functional Web Application.
- Comprehend and Propose Web Application Infrastructure.
- Apply Code Reuse With Templates, Libraries, And Snippets.

List of Practical's:

HTML5

1. Develop a web page for a Restaurants Menu Card using tables.
2. Design a web page for your College displaying various courses using Lists and Frames.
3. Design an Online Application form for your College.

CSS 3

1. To illustrate CSS Border Style Properties
2. To illustrate CSS Border Image Properties.
3. To illustrate CSS Selector Properties.

JAVA SCRIPT

1. Write a script to generate random numbers within 1 to 10 and display the numbers in a table.
2. Write a script to create an arithmetic calculator using function.
3. Write a script to check the given string is palindrome or not.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: The learning outcome of this course is for students to understand the most relevant technologies for development of web applications.

CO2: Students implement simple web applications that use technologies applicable to industry.

CO3: They select the best technological option for solving problems that require interaction with a web server.

CO4: Upon completion of this course, students will be able to evaluate, design and develop web applications using the industry's current protocols, models and architectures.

Semester-IV / Non Major Elective II	**HTML LAB**	**Course Code: KUE2Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To create Web application using tools and techniques used in industry.
- Create a web page.
- Create a link within a web page.
- Create a table within a web page.
- Insert heading levels within a web page.
- Insert ordered and unordered lists within a web page.

List of Practical's:

1. Create a web page to illustrate Html Body Tag and Pre Tags.
2. Create a web page to illustrate Text Font Tag.
3. Create a web page to illustrate Text Formatting Tag.
4. Create a web page using Marquee Tag.
5. Create a web page to illustrate the Image Tag
6. Create a web page to illustrate the Hyperlink Tag.
7. Create a web page to illustrate Order List and Unordered List Tag.
8. Create a web page to illustrate the table using Table Tag.
9. Create a web page to illustrate the Frame Tag.
10. Create a web page to illustrate the Form Tag.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Develop skills in analyzing the usability of a web site.

CO2: Understand how to plan and conduct user research related to web usability.

CO3: Understand basic concepts in HTML.

CO4: Insert and format text.

CO5: Implement a variety of hyperlinks to connect pages and communicate with users via email link. Structure content on web pages.

Semester-IV / Non Major Elective II	**INTERNET LAB**	**Course Code: KUE2Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Evaluate e-mail software and Web-based e-mail services
- Use search engines and directories effectively
- Find, evaluate, and use online information resources
- Create HTML documents and enhance them with browser extensions

List of Practical's:

1. E-Mail Creation
2. Using Search Engines
3. E-Pay
4. Online Shopping
5. Submitting Forms Online
6. Online converter (pdf, word, image, etc.,)
7. Design a Web site on your college.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Students in both the traditional and Internet classes
CO2: Students should use Email within Web to communicate with the instructor.
CO3: List important consumer concerns regarding purchasing items online

Semester-V / Core Course-X(CC)	**COMPUTER NETWORKS**	**Course Code: KUJ**
Instruction : 6	**Credits: 5**	**Exam : 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• This subject is designed to provide a strong background of computer network concepts, a good foundation covering the layers of OSI model. • Introduces issues relating to the designing of layers, network functionalities into layers. • To develop an understanding of computer networking basics. • To Describe how signals are used to transfer data between nodes. • To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.	
UNIT	**CONTENT**	**HOURS**
I	**OVERVIEW:** Data Communications - Networks - Protocol and Standards. Network Models: Layered tasks - OSI Model - TCP / IP Protocol Suite - Addressing	18
II	**PHYSICAL LAYER AND MEDIA:** Transmission Impairment – Performance. Transmission Media: Guided Media – Unguided Media. Data Link Layer: Types of Errors – Redundancy – Detection versus Correction – Block Coding. Data Link Control: Framing – Flow and Error Control – Protocols.	18
III	**NETWORK LAYER:** IPv4 Addresses - IPv6 Addresses - Unicast Routing Precools – Multicast Routing Protocols.	18

IV	**TRANSPORT LAYER:** Process-to-Process Delivery – User Datagram Protocol - TCP - Congestion - Congestion Control and Quality of Service: Congestion Control - Quality of Service.	18
V	**APPLICATION LAYER:** **Domain Name System**: Name space - Domain Name Space - Electronic Mail - File Transfer. **Cryptography**: Introduction - Symmetric key cryptography - Asymmetric key cryptography.	18
VI	Contemporary Issues : Expert lectures, online seminars – webinars	-

Text Book

Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw Hill Publications, 5th Ed., New Delhi, 2015.

Reference Books

1. Black Uyless D., **"Data Communication and Distributed Networks"**, 2000, Prentice Hallof India Pvt. Ltd., New Delhi.
2. Forouzan Behrouz A., **"Local Area Networks"**, 2003, Tata McGraw Hill PublishingLimited, New Delhi.
3. Godbole Achyut S., **"Data Communication and Networks"**, 2002, Tata McGraw Hill Publishing Limited, New Delhi.
4. Mansfield Kenneth C., Antonakos James L., **"An Introduction to Computer Networking"**, 2002, Prentice Hall of India, New Delhi.
5. Tanenbaum Andrew S., **"Computer Networks"**, 2003, Pearson Education,Asia.

Web Resources:

https://www.mrecacademics.com/DepartmentStudyMaterials/20201223-computer%20Networks.pdf

https://www.smartzworld.com/notes/computer-network-notes-pdf-cn/

Course Outcomes

On completion of the Course, the learner will be able to

CO1: Work with internet concepts
CO2: Be familiar with the functionality of each layer of OSI
CO3: And recall the functions of TCP/IP reference model.
CO4: Build up a clear concern on the networking technologies
CO5: Understand the data communication system, Understand the components and the purpose of layered architecture.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Core Course-XI(CC)	PYTHON PROGRAMMING	Course Code: KUK
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• After learning this course, the learner would have acquired the fundamental knowledge on Python programming • Understood the language and hence the learner becomes skillful in python programming • Known the usage of modules and packages in python • Familiarity with the file concept in python been skillful experimenting the concepts of OOPs with python language • Capable of solving problems using Python	
UNIT	**CONTENT**	**HOURS**
I	Python –origins – features – variable and assignment - Python basics -statement and syntax-Identifiers – Basic style guidelines – Python objects – Standard types and other built-in types-Internal types – Standard type operators – Standard type built-in functions	18
II	Numbers – Introduction to Numbers – Integers – Double precision floating point numbers - Complex numbers – Operators – Numeric type functions – Sequences: Strings, Lists and Tuples – Sequences – Strings and strings operators – String built-in methods – Lists –List type Built in Methods – Tuples.	18
III	**Mapping type**: Dictionaries – Mapping type operators – Mapping type Built-in and Factory Functions - Mapping type built in methods – Conditionals and loops – if statement – else Statement – elif statement – conditional	18

	expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function - Files and Input/Output – File objects – File built-in functions – File built-in methods – File built-in attributes – Standard files – command line arguments.	
IV	Functions and Functional Programming – Functions – calling functions – creating functions – passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances.	18
V	Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, Mysql - Regular Expression – Special Symbols and Characters – REs and Python.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book:

Wesley J. Chun, Core Python Programming, Pearson EducationPublication, 2012

Reference Books:

1. Wesley J. Chun, Core Python Application Programming, Pearson Education Publication, 2015.
2. Eric Matthes, Python crash course, William Pollock, 2016.
3. Zed Shaw, Learn Python the hard way, Addition Wesley, 2017.

Web Resources:

https://www.tutorialspoint.com/python/python_data_science
http://astronomi.erciyes.edu.tr/wpcontent/uploads/astronom/pdf/OReilly%20Python%20for%20Data%20Analysis.pdf
https://tanthiamhuat.files.wordpress.com/2018/04/pythondatasciencehandbook.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Describe the basic built-in functions and syntax of Python programming.

CO2: Explain the mapping and file concept.

CO3: Explain the object oriented programming concept.

CO4: Illustrate the concepts of decision making and construct statements.

CO5: Illustrate the usage of database and regular expression

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-V Core Course-XII (CC)	SOFTWARE ENGINEERING	Course Code: KUL
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Knowledge of basic SW engineering methods and practices, and their appropriate application. • Describe software engineering layered technology and Process frame work. • A general understanding of software process models such as the waterfall and evolutionary models. • Understanding of software requirements and the SRS documents. • Understanding of the role of project management including planning, scheduling, risk management, etc.	
UNIT	**CONTENT**	**HOURS**
I	**INTRODUCTION** Introduction to Software Engineering - Software Process - Software Process Models - Software Model - Requirements Engineering Principles : Requirements Engineering - Importance of Requirements - Types of Requirements - Steps involved in Requirements Engineering	18
II	**REQUIRMENTS ANALYSIS MODELING** Analysis Modeling Approaches - Structured Analysis - Object Oriented Analysis - Design and Architectural Engineering : Design Process and Concepts - Basic Issues in Software Design - Characteristics of Good Design - Software Design and Software Engineering - Function Oriented System vs Object Oriented System - Modularity, Cohesion, Coupling, Layering - Real Time Software Design - Design Models - Design Documentation	18

III	**OBJECT ORIENTED CONCEPTS** Fundamental Parts of Object Oriented Approach - Data Hiding and Class Hierarchy Creation - Relationships - Role of UML in OO Design - Design Patterns - Frameworks - Object Oriented Analysis - Object Oriented Design - User Interface Design : Concepts of User Interface - Elements of User Interface - Designing the User Interface - User Interface Evaluation - Golden Rules of User Interface Design - User Interface Models - Usability	18
IV	**SOFTWARE CODING** Introduction to Software Measurement and Metrics - Software Configuration - Project Management Introduction - Introduction to Software Testing - Software Maintenance	18
V	**WEB ENGINEERING** Introduction to Web - General Web Characteristics - Web Application Categories - Working of Web Application - Advantages and Drawbacks of Web Applications - Web Engineering - Emerging Trends in Software Engineering - Web 2.0 - Rapid Delivery - Open Source Software Development - Security Engineering - Service Oriented Software Engineering - Web Service - Software as a Service - Service Oriented Architecture - Cloud Computing - Aspect Oriented Software Development - Test Driven Development - Social Computing	18
VI	Contemporary Issues : Expert lectures, online seminars – webinars	-

Text Book:

Software Engineering, Chandramouli Subramanian, Saikat Dutt, Chandramouli Seetharaman, B.G. Geetha, Pearson Publications, 2015 .

Reference Book:

Software Engineering, Jibitesh Mishra, Pearson E.

Web Resources:

http://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf
https://nptel.ac.in/downloads/106105087/

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: An ability to design and conduct experiments, as well as to analyze and interpret data.

CO2: An ability to function on multi-disciplinary teams.

CO3: An ability to identify, formulate, and solve engineering problems.

CO4: An understanding of professional and ethical responsibility.

CO5: Students can apply the knowledge, techniques, and skills in the development of a software product.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Major Based Elective Course – I (MBE)	**MOBILE COMPUTING**	**Course Code: KUE3**
Instruction : 6	**Credits: 6**	**Exam : 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To understand the basic concepts and methods of mobile communication systems. • To impart fundamental concepts in the area of mobile computing, to provide a computer systems perspective on the converging areas of wireless networking, embedded systems, software • To introduce selected topics of current research interest in the field. • It will provide a complete overview of the mobile computing subject area, including the latest research • In both broad and in-depth knowledge, and a critical understanding of mobile computing from different viewpoints: infrastructures, principles and theories, technologies, and applications in different domains.	
UNIT	**CONTENT**	**HOURS**
I	**MOBILE COMMUNICATIONS OVERVIEW**: Mobile Communication- Mobile Computing – Mobile Computing Architecture -Mobile System Networks - Data Dissemination - Mobility management -Security. **Mobile Systems:** Mobile Phones - Smart Systems - Limitations of Mobile Devices	18
II	**GSM AND SIMILAR ARCHITECTURES :** GSM - Services and System Architecture - Radio Interfaces - Protocols - Localization - Calling – Handover - Security - GPRS. 44 45 **Wireless Medium Access Control And Cdma- Based Communication:** Medium Access Control - Introduction to CDMA Based Systems	18
III	**MOBILE IP NETWORK LAYER** :	18

	IP and Mobile IP Network Layers – Packet Delivery and Handover Management - Location Management – Registration - Tunnelling and Encapsulation - Route Optimization. **Mobile Transport Layer:**Conventional TCP/IP Transport Layer Protocols - Indirect TC P - Snooping TCP - Mobile TCP.	
IV	**MOBILE DEVICES** Device Management - Mobile File Systems - Security. **Mobile Ad-Hoc And Sensor Networks:** Introduction to Mobile Ad-Hoc Network - MANET - Wireless Sensor Network - Applications.	18
V	**MOBILE APPLICATION LANGUAGES** XML - JAVA -J2ME - JAVA Card. **Mobile Opearting Systems:** Operating System - Windows CE - Symbian OS - Linux for Mobile Devices - Android.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book :

Raj Kamal, "Mobile Computing", Oxford University Press, New Delhi, 2010.

Reference Books :

Jochen Schiller, "Mobile Communication", Pearson Education, New Delhi, 2008.

Web Resources:

https://cseexamhacks.files.wordpress.com/2017/01/mobile-computing.pdf
https://www.vidyarthiplus.com/vp/attachment.php?aid=43026

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: To explore Mobile security issues.
CO2: To integrate multimedia, camera and Location based services in Android Application
CO3: To be familiarized with Intent, Broadcast receivers and Internet services.
CO4: To learn activity creation and Android UI designing.
CO5: To understand IP and TCP layers of Mobile Communication.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-V / Major Based Elective Course – I (MBE)	BIG DATA ANALYTICS	Course Code: KUE3
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• The course provides an introduction to big data analytics and Hadoop architecture. • It introduces the Map Reduce programming model. • It provides insight on NoSQL databases and querying model used in Big Data. • Understand the Big Data Platform and its Use cases • Provide an overview of Apache Hadoop	
UNIT	**CONTENT**	**HOURS**
I	Overview of Big Data: Defining Big Data - Big Data Types – Big Data Analytics – Industry Examples of Big Data - Big Data and Data Risk – Big Data Technologies – Benefits of Big Data	18
II	Basics of Hadoop: Big Data and Hadoop – Hadoop Architecture – Main Components of Hadoop Framework – Analysing Big Data with Hadoop – Benefits of Distributed Applications – Hadoop Distributed File System – Advantages of Hadoop – Ten Big Hadoop Platforms	18
III	MapReduce: Introduction to MapReduce –Working of MapReduce – Map operations –MapReduce User Interfaces	18
IV	NoSQL Databases: NoSQL Data Management – Types of NoSQL Databases – Query Model for Big Data – Benefits of NoSQL – MongoDB – Advantages of MongoDB over RDBMS –Replication in MongoDB.	18
V	HBase, CASSANDRA and JAQL: Introduction to HBase – Row-oriented and Column-oriented Data Stores – HDFS Vs HBase – Hbase	18

	Architecture – HBase Data Model – Introduction to Cassandra –Features of Cassandra . Introduction to JAQL – JSON – Components of JAQL.	
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book

V.K. Jain Big Data and Hadoop Khanna Book Publishing 2017

Reference Books

1 Frank J Ohlhorst Big Data Analytics: Turning,Big Data into Big Money,Wiley and SAS,Business Series,2012

2 AnandRajaraman,Jeffrey David,Ullman,Mining of Massive Datasets Cambridge,University Press 2012

3 Paul Zikopoulos ,Chris Eaton, Paul Zikopoulos,U nderstanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data Tata McGraw Hill 2011

Web Resources

https://www.ti.rwth-aachen.de/teaching/BigData/FBDA.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Demonstrate the working of row and column oriented data stores

CO2: Describe the Hadoop architecture and File system

CO3: Apply the MapReduce Programming model for real-worldproblems

CO4: Distinguish NoSQL databases from RDBMS

CO5: Define the big data, types of data and understand the need of bigdata analytics

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	M
CO2	S	M	S	S	S	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S
5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-V / Major Based Elective Course – I (MBE)	**ARTIFICIAL INTELLIGENCE**	**Course Code: KUE3**
Instruction : 6	**Credits: 6**	**Exam : 3**
Internal Marks -25	**External Marks-75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• This subject deals with intelligent behavior, learning, and adaptation in machines,intended to assess the applicability, basic knowledge representation, problem solving and learning methods. • To impart knowledge about Artificial Intelligence. • To give understanding of the main abstractions and reasoning for intelligent systems. • To enable the students to understand the basic principles of Artificial Intelligence in various applications.	
UNIT	**CONTENT**	**HOURS**
I	Artificial intelligence meaning- The AI problems – The underlying assumption – What is an AI Techniques? – The level of the model. Problems, problem spaces, and search: Defining the system – problem characteristics – production system characteristics.	18
II	**Heuristic Search techniques:** Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis. Knowledge representation issues: Representations and mappings – Approaches to knowledge representation.	18
III	**Using predicate logic:** Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction.Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning –	18

	Matching – Control Knowledge.	
IV	**Game playing**: Overview – The minimax search procedure – Adding alpha – beta cutoffs Additional refinements – Iterative Deepening – References on specific games. Understanding: What is understanding? What makes understanding hard? Planning- The blocks world- components of a planning system –Good stack planning-Coral Stack planning- Non linear planning using constraint posting.	18
V	**Expert systems:** Representing & using domain knowledge – Expert system shells – Knowledge acquisition. Perception and Action: Real-time search – perception-Action – Robot Architectures.Prolog- the National languages of Artificial intelligence- introduction- converting English to prolog facts and rules-Goals-prolog terminology-Variables-Control structure-Arithmetic Operators-Matching in prolog-Backtracking.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book

Artificial Intelligence, Elaine rich, Kevin Knight,Shivashankar B Nair, Tata McGraw Hill publication 3rd Edition, 2011

References Books

1. Artificial Intelligence, Mishra R.B, Prentice Hall of India, 2010
2. A First Course in Artificial Intelligence, Deepak Khemani, Mc-Graw Hill Educaion Pvt.Ltd. 2013
3. Artificial Intelligence: A Modern Approach, Stuart Russell, Pearson, 3rd Edition, 2013

Web Resources:

https://eecs.wsu.edu/~cook/ai/lectures/p.hltm

http://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf

Course Outcomes:

On completion of the Course, the learner will be able

CO1: To understand the basics of Artificial Intelligence , Intelligent Agents and its structure
CO2: To understand the problem solving by various searching techniques
CO3: To understand the concept of informed search and Exploration, constraint satisfaction Problems and Adversarial Search
CO4 : To Understand what is Reasoning and Knowledge Representation
CO5: To understand the concept of Reasoning with Uncertainty & Probabilistic Reasoning

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	M	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	M	M	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S	S
5	S	S	S	S	S	S	M	S	M	S

S - Strongly Correlated
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N – No Correlation

Semester-V / Skill Based Course II	**PYTHON AND BIO INFORMATICS LAB**	**Course Code: KUS2Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Describe the Strings, List, Tuples and Dictionaries in Python.
- Demonstrate the power of Numbers, Math functions in python
- Develop linked data structures such as linear and binary search.
- Demonstrate the techniques for command line arguments.
- Create elliptical orbits and bouncing ball in Pygame .
- Experiment Python scripting language to develop innovative real time Applications.

List of Practical's

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‟s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame.

Course Outcomes:

On completion of the Course, the learner will be able to

- Practice the Python programming language from its scratch: its syntax, idioms, patterns and styles.
- Illustrate the essentials of the Python library, and learn how to learn about other parts of the library when you need them.
- Interpret the mathematical results in physical and other forms.
- Identify, formulate and solve the Linear Differential Equations.
- Classify and solve the contour integration of complex functions

Semester-V / Skill Based Course II	OPEN SOURCE PRODUCT LAB	Course Code: KUS2Y
Instruction : 2	Credits: 2	Exam : 3
Internal Marks -40	External Marks-60	Total Marks: 100

Course Objective

- Demonstrate different open source technology like Linux, PHP & MySQL with different packages.
- Explore programs of PHP with MySQL connection.
- To understand the need, advantages and applications of open source software
- To work with open source database and open source programming languages
- To develop applications in PHP using various concepts like arrays, udf's, Sessions and make the students to understand and to establish the connectivity between PHP and MySQL

List of Practical's

1. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a mysql table.
4. Write a PHP program interface to create a database and to insert a table into it.
5. Write a PHP program using classes to create a table.
6. Write a PHP program to upload a file to the server.
7. Write a PHP program to create a directory, and to read contents from the directory.
8. Write a shell program to find the details of an user session.
9. Write a shell program to change the extension of a given file.
10. Create a mysql table and execute queries to read, add, remove and modify a record from that table.

Course Outcomes

On completion of the Course, the learner will be able to

CO1: Implement various applications using build systems
CO2: Understand the installation of various packages in open source operating systems
CO3: Create simple GUI applications
CO4: Explore different open source technology like Linux, PHP & MySQL with different packages.
CO5: Execute programs of PHP with MySQL connection

Semester-V / Skill Based Course III	**ANDROID LAB**	**Course Code: KUS3Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Describe Android platform, Architecture and features.
- Understanding of the real-time embedded and mobile systems, and the techniques essential to the design and implementation of mobile applications.
- Understand the various parts of an Android Project.
- Use the Android Emulator.
- Install and run the application on a physical device.
- Create a simple User Interface.

List of Practical's:

1. Different Layout design including nested layout for a single biodata.
2. Arithmetic Operation for two numbers
3. Business Calculator
4. Animation: Bouncing of a ball
5. Intent
6. Database SQLite: Student Biodata
7. Fragments - Tablet Programming
8. Media Player

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Use Intent , Broadcast receivers and Internet services in Android App.
CO2: Design and implement Database Application and Content providers.
CO3: Use multimedia, camera and Location based services in Android App.
CO4:Discuss various security issues in Android platform

Semester-V / Skill Based Course III	**MULTIMEDIA LAB**	**Course Code: KUS3Y**
Instruction : 2	**Credits: 2**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- To understand about data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG, and the basic concepts about animation.
- To offer the knowledge of creating and working with digital images .
- To manipulate them and to develop a presentation package using multimedia tools.
- To give an overall view of multimedia tools.
- To understand and differentiate text, image, video & audio.

List of Practical's:

GIMP (Photoshop Equivalent)

1. Cropping images using Lasso Tools
2. Designing Pictures using Paint Tools
3. Designing Text using Text Tools
4. Applying Layer Effects to Images and Texts

Synfig (wiki.synfig.org / Category: Tutorials) (Flash equivalent)

1. Create an animation for bouncing a ball
2. Create brushed outlines for an image
3. Build a magnifying glass
4. Develop a slide show of photos with transitions

Aptana (http://content.aptana.com/aptana/tutorials/)(Dreamweaver equivalent)

1. Developing a simple webpage with images and links
2. Develop a webpage displaying the timetable of the Department
3. Design an application form for Student Admission
4. Create your own web blog for college events

Course Outcomes:

On completion of the Course, the learner will be able

CO1: To learn and understand technical aspect of Multimedia System
CO2: To Design and implement an animation for various themes.
CO3: To Prepare multimedia advertisement.
CO4: To Develop various Multimedia Systems applicable in real time.
CO5: To develop multimedia application and analyze the performance of the same.

Semester-V	SOFT SKILL DEVELOPMENT	Course Code: SSD
Instruction : 2	Credits: 2	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To encourage the all-round development of students by focusing on soft skills of team work, Inter-personal relationships, conflict management and leadership quality.	
UNIT	**CONTENT**	**HOURS**
I	**KNOW THYSELF/UNDERSTANDING SELF** Introduction to soft skills-Self discovery-Developing positive attitude – Improving perceptions – Forming values.	6
II	**INTERPERSONAL SKILLS / UNDERSTANDING OTHERS** Developing interpersonal relationships-Team building–Group dynamics-Networking-Improved work relationship.	6
III	**COMMUNICATION SKILLS / COMMUNICATION WITH OTHERS** Art of listening-Art of Reading- Art of Speaking-Art of Writing-Art of Writing E-Mail-E-Mail Etiquette.	6
IV	**CORPORATE SKILLS / WORKING WITH OTHERS** Developing Body Language-Practising Etiquette and Memorise –Time Management-Stress Management.	6
V	**SELLING SELF/JOB HUNTING** Writing Reuse / CV-Interview Skills-Group Discussion-Mock Interview-Mock GD-Goal Setting-Career Planning.	6

Text Book:

A Book an Development Of Soft Skill Dr. K. Meena & Dr.V. Ayothi. Soft Skills-Dr. K. Alex & Chand Company.

Reference Books:

1. Developing the leader within you John C. Maxwell
2. Good to Great by Jim Collins.

Course Outcomes:

Students will develop their social and work-life skills, as well as their personal and emotional well-being, including to

CO1: Resilience

CO2: Teamwork

CO3: Leadership

CO4: Communication, Emotional maturity and emotional health

CO5: Confidence and enthusiasm for learning,, Citizenship, Responsibility

Mapping of Cos with Pos & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-VI / Core Course-XIII(CC)	OPERATING SYSTEMS	Course Code:KUM
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To gain the basic knowledge about the operating systems and its various schemes and services. • To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system. • To provide students knowledge of memory management and deadlock handling algorithms • At the end of the course, students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system.	
UNIT	**CONTENT**	**HOURS**
I	**INTRODUCTION :** Meaning – Early Systems - Multiprogrammed Batch Systems – Real-Time Systems. **Computer System Structures**: Computer-System Operation - Storage Hierarchy - General System Architecture. **Operating System Structures:** System Components - System Calls - Virtual Machines - System Generation.	18
II	**PROCESS MANAGEMENT**: Processes - Process Concept - Operation on Processes - Inter-Process Communication. **CPU Scheduling:** Basic Concepts - Scheduling Algorithms - Real Time Scheduling. **Process Synchronization:** Background - Critical-Selection Problem –Semaphores. **Deadlocks:** System Model - Methods for Handling Deadlocks - Deadlock Avoidance - Recovery from Deadlock.	18
III	**MEMORY MANAGEMENT:** Background - Swapping - Paging - Segmentation with Paging. **Virtual Memory:** Demand Paging – Page Replacement - Allocation of Frames –	18

	Thrashing.	
IV	File Concept - Access Methods – Directory Structures File-System Implementation: File-system Structure – Allocation Methods - Directory Implementation - Efficiency and Performance **FILE - SYSTEM INTERFACE**: File Concept - Access Methods – Directory Structures File-System Implementation: File-system Structure – Allocation Methods - Directory Implementation - Efficiency and Performance - Recovery. **MASS STORAGE STRUCTURE:** Disk Structure - Disk Scheduling - Swap-Space Management - Stable-Storage Implementation.	18
V	**PROTECTION:** Goals of Protection - Access Matrix - Capability Based Systems - Language-based Protection. **Security:** The Security Problem - Authentication - Security Systems and Facilities - Encryption. **Distributed Systems:** Distributed System Structures: Background – Distribution Coordination: Mutual Exclusion- Atomicity – Concurrency Control – Deadlock Handling- Election Algorithms.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Book

Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Ed., John Wiley & Sons Inc., New Delhi 2013.

Reference Book

1. Harvey M. Deitel, "An Introduction to Operating System", 3rd ed., Addison Wesley, New York, 2003.

2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th ed., Prentice Hall, New Delhi, 2014.

Web Resources:

http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf

http://www.crectirupati.com/sites/default/files/lecture_notes/Operating%20Systems%20Lecture%20Notes.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Understand the basic concept of Computer System and Operating System Structure

CO2: Gain Knowledge of the fundamental aspects of process and processor managements with deadlocks and CPU scheduling, Introduce memory and virtual memory techniques

CO3: Understand files, directories and its accessing methods and its structures

CO4: Ability to know mass storage devices and its scheduling

CO5: Understand the security on the operating system and protection mechanisms.

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Core Course-XIV(CC)	WEB TECHNOLOGY	Course Code: KUN
Instruction : 6	Credits: 5	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Define the knowledge about HTML document with element types, hyperlinks, images, list, tables and forms. • Analyze a web page and identify its elements and attributes. Create web pages using XHTML and Cascading Style Sheets. • Build dynamic web pages using JavaScript (Client side programming). • Create XML documents and Schemas.	
UNIT	**CONTENT**	**HOURS**
I	Fundamentals of HTML:-Understanding Elements: Root Elements-Metadata Elements- Section Elements-Heading Elements. Describing data types	18
II	HTML5 and its essentials-Exploring New Features of HTML5-Next Generation of Web Development-Structuring an HTML Document-Exploring Editors and Browsers Supported by HTML5-Creating and Saving an HTML Document-Validating an HTML Document-Viewing an HTML Document-Hosting Web Pages.	18
III	**DHTML:** Introduction - Cascading Style sheets - DHTML Document Object Model and collections – Event Handling - Filters and Transitions - Data Binding.	18
IV	**JAVASCRIPT:** Introduction- Language Elements - Objects of JavaScript- Other Objects. **VBSCRIPT:** Introduction- Embedding VBScript Code in an HTML Document-	18

	Comments- Variables- Operators-Procedures- Conditional Statements- Looping Constructs - Objects and VBScript - Cookies.	
V	**EXTENSIBLEMARK-UPLANGUAGE(XML):** Introduction- HTML vs. XML- Syntax of the XML Document- XML Attributes- XML Validation- XML DTD- The Building Blocks of XML Documents-DTD Elements - DTD Attributes- DTD Entities- DTD Validation – XSL - XSL Transformation- XML Namespaces- XML Schema.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Books:

1. Web Technology A Developer's- Perspective(Unit III, IV, V), N.P.Gopalan, J.Akilandeswari, PHI LearningPvt.Ltd, 4th Edition, 2011
2. `HTML5 BlackBook (I, II), Kogent LearningSolutions Inc, Dreamtech Press, 2011.

Reference Books:

1. Web Technology, Akanksha Rastogi, K.Nath & Co Educational Publishers, 1st Edition.
2. Intoduction toWeb Technology, Anuranjan Misra,Arjun Kumar Singh, Laxmi Publication, 2011.
3. World Wide Web Design withHTML, C.Xavier, TMH Publishers, 2008.

Web Resources:

https://mrcet.com/downloads/digital_notes/IT/WEB%20TECHNOLOGIES%20(R15A0520).pdf

http://yellaswamy.weebly.com/web-technologiesiiibtech-ii-sem.html

Course Outcomes

On completion of the Course, The learner will be able to

CO1: Illustrate the web technology concept to create schemas and dynamic web pages.

CO2:Understand the concept of CSS for dynamic presentation effect in HTML and XML documents.

CO3: Describe the mark-up languages for processing, identifying and presenting information in web pages.

CO4: Apply scripting languages in HTML document to add interactive components to web pages

CO5: Define the knowledge about HTML document with element types, hyperlinks, images, list, tables and forms

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W-Weakly Correlated

N – No Correlation

Semester-VI / Core Course-XV(CC)	PROJECT	Course Code: KUOP
Instruction : 6	Credits: 5	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Course Objectives:

- To provide basic knowledge of the real time projects of the IT industry. To develop mini real time software's using any platforms such as C, C++, Java, VB, Dotnet, C#, ASP.net,VB.net, Android, iOS, Linux, Python, etc.
- To Identify Project scope, Objectives and Infrastructure.
- To Develop Activity diagram and Class diagram
- To Develop Sequence diagrams and Collaboration Diagram
- To add interface to class diagram

Course Outcomes:

On completion of the Course, the learner will be able

CO1: Able to elicit, analyze and specify software requirements.

CO2: Plan a software engineering process life cycle.

CO3: Realize design practically, using an appropriate software engineering methodology

CO4: Analyze and translate a specification into a design.

CO5: Able to use modern engineering tools for specification, design, implementation, and testing

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Major Based Elective Course II(MBE)	COMPUTER GRAPHICS	Course Code:KUE4
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To impart the basic principles of generating primitives, shapes, package development, interactive graphics, raster graphics, two and three dimensional graphics and their transformations. • To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations. • To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations. • The computer graphics course prepares students for activities involving in design, development and testing of modeling, rendering, shading and animation.	
UNIT	**CONTENT**	**HOURS**
I	Basic Concepts:- Introduction – Uses of computer graphics – Display devices -, CRT, Color CRT monitors – Inherent memory devices – Direct view storage tube – Flat panel displays–Three dimensional viewing devices, Raster scan system, Random scan system, aspect ratio.	18
II	Line drawing algorithm – Simple DDA – Bresenham's line drawing algorithm – circle generation. Two-dimensional transformations: Basic transformations, Matrix representation - Composite transformation of translation, rotation, scaling – Pivot, point rotation – fixed point scaling, other transformation.	18
III	Clipping and Windowing: Point clipping –Line clipping – Sutherland – Liang Barsky - Hodgeman polygon clipping – Text clipping – Viewing transformation – Windowing transformation.	18
IV	Graphical input devices: – Pointing and Positioning – keyboard, mouse,	18

	trackball, joystick, scanner, light pens, and tables. Three-dimensional input devices: - printers and plotters.Three-dimensional concepts: - Three dimensional display methods – Three-dimensional transformation – translation, rotation, scaling – Three dimensional viewing – Viewing pipeline – Viewing coordinates – Projections.	
V	Hidden surface removal - Object space methods – Back face detection method – Painter's algorithm – Image space methods – Area subdivision – Octree – Depth – buffer – Scanline – Ray tracing, Surface renderings – Surface textures – Shading	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text book

Computer Graphics – C Version, Donald Hearn & M. Pauline Baker, Pearson Education, 2nd Edition,2013

Reference Book

1. Geometric Tools for Computer Graphics, Philip J. Schneider, David H. Eberly, Morgan Kaufmann Publishers, 2005
2. Principles of Interactive Computer Graphics, William M.Newman, Robert F. Sproull, Tata McGraw Hill, 2nd Edition,2002

Web Resources:

http://www.svecw.edu.in/Docs%5CCSECGLNotes2013.pdf
https://drive.google.com/file/d/1st2YSA6l3KoCGiNxFmSAXHMbCdxEHN9i/view

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

CO2: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.

CO3: Use of geometric transformations on graphics objects and their application in composite form.

CO4: Extract scene with different clipping methods and its transformation to graphics display device.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S
CO3	M	M	S	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Major Based Elective Course II (MBE)	CYBER SECURITY	Course Code: KUE4
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Remember and understand the fundamentals of security algorithm. • Analyze the various symmetric key and public key algorithms. • Understand the techniques to secure data in Hash algorithms. • Remember the security algorithm in various layers. • Analyze the various attacks in networks.	
UNIT	**CONTENT**	**HOURS**
I	**SECURITY FUNDAMENTALS**: Introduction, Terminology, Attacks, Security Goals : Authentication, Authorization, Cipher Techniques: Substitution and Transposition, One Time Pad, Modular Arithmetic, GCD, Euclid‟s Algorithms, Chinese Remainder Theorem, Discrete Logarithm, Fermat Theorem, Block Ciphers, Stream Ciphers. Secret Splitting and Sharing.	18
II	**CRYPTOGRAPHY :** Symmetric Key Algorithms: DES, AES, BLOWFISH, Attacks on DES, Modes of Operations, Linear Cryptanalysis and Differential Cryptanalysis, Public Key Algorithms: RSA, Key Generation and Usage.	18
III	**MESSAGE DIGEST AND KEY MANAGEMENT :** Hash Algorithms: SHA-1, MD5, Key Management: Introduction, Key Management: Generations, Distribution, Updation, Digital Certificate, Digital Signature, PKI. Diffie Hellman Key Exchange. One Way Authentication, Mutual Authentication, Kerberos 5.0.	18
IV	**NETWORK SECURITY** Layer Wise Security Concerns, IPSEC-	18

	Introduction, AH and ESP, Tunnel Mode, Transport Mode, Security Associations, SSL- Introduction, Handshake Protocol, Record Layer Protocol. IKE- Internet Key Exchange Protocol. Intrusion Detection Systems: Introduction, Anomaly Based, Signature Based, Host Based, Network Based Systems.	
V	**INTRODUCTION TO CYBER SECURITY:** Introduction, Definition and origin, Cybercrime and Information security, Classification of Cybercrimes, The legal perspectives- Indian perspective ,Global perspective, Categories of Cybercrime, Types of Attacks, a Social Engineering, Cyber stalking, Cloud Computing and Cybercrime	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Books:

1. BruiceSchneier, "Applied Cryptography- Protocols, Algorithms and Source code in C", 2nd Edition, Wiely India Pvt Ltd, ISBN 978-81-265-1368-0
2. Nina Godbole, SunitBelapure, "Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiely India Pvt.Ltd.,ISBN- 978-8265-2179-1
3. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, ISBN-978-81-315- 1349-1

Reference Books:

1. Nina Godbole, " Information Systems Security", Wiley India Pvt. Ltd
2. Willaim Stallings, "Computer Security: Principles and Practices", Pearson Ed.
3. Mark Merkow, " Information Security-Principles and Practices", Pearson Ed
4. CK Shyamala et el., "Cryptography and Security", Wiley India Pvt. Ltd,
5. Berouz Forouzan, "Cryptography and Network Security", 2 edition, TMH,

Web Resources:

https://mrcet.com/pdf/Lab%20Manuals/IT/CYBER%20SECURITY%20(R18A0521).pdf
https://uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf
https://s3.studentvip.com.au/notes/31355-sample.pdf?v=1560439759

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.

CO2: Design, develop, test and evaluate secure software.

CO3: Develop policies and procedures to manage enterprise security risks.

CO4: Analyze the techniques of Symmetric Key , Algorithms and Public Key Algorithms.

CO5: Investigate the message digest and key management

Mapping of COs with POs & PSOs:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	M	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Major Based Elective Course II(MBE)	E-COMMERCE	Course Code: KUE4
Instruction : 6	Credits: 6	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• The course is designed to acquaint the students with the growth of Entrepreneurship in the field of ecommerce and its role in Industrial Development with the advancement in technologies. • This course provides an introduction to information systems for business and management. • It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information system	
UNIT	**CONTENT**	**HOURS**
I	Electronic Commerce Framework: Media convergence – Anatomy of E-Com applications – consumer organization applications. Network Infrastructure for E-commerce – Internet as a Network Infrastructure.	18
II	The Business Internet Commercialization – Network Security and Firewalls –E- commerce and WWW.	18
III	Consumer oriented E-commerce – Electronic payment system – Inter-organizational commerce and EDI	18
IV	EDI Implementation – MIME and Value Added Networks – Intra organizational E- commerce – The Corporate Digital Library	18
V	Advertising and Marketing on the Internet – Consumer Search and Resource Discovery – On –Demand Education and Digital Copyrights, Case Studies in India.	18
VI	Contemporary Issues: Expert lectures, online seminars – webinars	-

Text Books:

1. Frontiers of Electronic Commerce, RaviKalakota, Andrew B.Whinston, Pearson Education, 1st Edition, 2009.
2. `E-Commerce(V unit), Kamlesh K Bajaj,Debjani Nag, Tata McGraw-Hill2nd Edition, 2008.

Web Resources:

https://www.vssut.ac.in/lecture_notes/lecture1428551057.pdf

http://www.universityofcalicut.info/SDE/Ecommerce_Mngmnt_compl_bcom_on04sept2015.pdf

https://saif4u.webs.com/E-ommerce-Notes.pdf

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: The students can learn why information systems are so important today for business and management.

CO2: Evaluate the role of the major types of information systems in a business environment and their relationship to each other.

CO3: Assess the impact of the Internet and Internet technology on business-electronic commerce and electronic business.

CO4: Identify the major management challenges to building and using information systems and learn how to find appropriate solutions to those challenges

CO5: Learn the core activities in the systems development process.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	M	M	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	M	S

S - Strongly Correlated
M - Moderately Correlated
W-Weakly Correlated
N – No Correlation

Semester-VI / Major Based Elective Course III (MBE)	**WEB TECHNOLOGY AND BIOINFORMATICS LAB**	**Course Code:KUE5Y**
Instruction : 5	**Credits: 5**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Experience to the learners in HTML programming based on concept learned with program course.
- Implementation of HTML commands and Cascading Style Sheets

List of Practical's:

1 Exercises using Formatting Tags.

2 Exercises to implement table tags.

3 Exercises using List Tags.

4 Exercises to implement Frames and Frame sets

5 Exercises using Cascading Style Sheets.

6 Exercises to implement image, background color and text.

7 Exercises using Radio buttons, Check boxes and List boxes.

8 Exercises to implement ADD, DELETE and UPDATE records in the table using ADO.NET.

9 Retrieve the structures of the compounds from PubChem: Xylitol, Saccharine, Aspartame

10 Perform the PHI-BLAST and PSI-BLAST for the protein sequence Q1A232. Write the top 4 E scores values and the Sequence ID until convergence.

11 Perform Pair wise alignments for the proteins Insulin from the organism's homo sapiens and Musmusculus. Calculate the Percent Similarity and Identity using BLOSUM 62 and PAM 250 Compare the results.

12 Perform the protein –ligand docking using ARGUSLAB for the given receptor and ligand (select the compounds from the databases) and compare the dock score.

13 Find the super secondary structure for any protein database.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Identify the operators to learn the basic HTML commands
CO2: Understand the concept of Hyperlinks, Use of Cascading Style sheets.
CO3: Implement HTML concept in developing simple applications
CO4: Implementing the techniques for DNA Transcription and Mutation

Semester-VI / Major Based Elective Course III (MBE)	**UI/UX Design and Animation Lab using Open Source Tools**	**Course Code: KUE5Y**
Instruction : 5	**Credits: 5**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objectives:

- Demonstrate the techniques of photo editing.
- Apply layer masks, filters and blending modes, share and save your images in various formats.
- Demonstrate the techniques for resize and crop images.
- Learn various retouching and repairing techniques to correct images and Learn the creation of various shapes and working with various files.
- Identify a web sites target audience and create user personals to create an audience appropriate design for a web site.

List of Practical's

Photoshop

1. Using various selection tools
2. Using image adjustment tools to enhance an image
3. Create scenery using Photoshop brushes.
4. Demonstrate the use of layer effects.
5. Create a text with picture inside.
6. Demonstrate the use of ripple effect and lens flare.
7. Create a snapshot inside a photo.
8. Photo retouching.
9. Coloring a BW photo.
10. Create slide mount template.
11. Create Photo mount template.
12. Create photo frame effect.
13. Create photo film effect.

14. Create a 3D Photo effect.

15. Create 2D and 3D logos.

16. Animate text using Image Ready.

17. Create three frames with Lens flare effect and different background colors and animate using Image Ready.

18. Create a Christmas Tree with Blinking Lights.

19. Animate a candle flame using Liquify filter.

Adobe Illustrator

1) Working with files.

2) Working in layers.

3) Viewing artwork.

4) Making Selections.

5) Creating Basic Shapes.

6) Working with type.

7) Placing Images.

8) Working with Objects.

9) Drawing graphs.

10) Working with imported artwork.

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Understand the Usability of Interactive systems.
CO2: Understand Guidelines and Principles
CO3: Be able to manage the development process and interaction styles.

Semester-VI / Major Based Elective Course III (MBE)	**SOFTWARE TESTING TOOLS LAB**	**Course Code: KUE5Y**
Instruction : 5	**Credits: 5**	**Exam : 3**
Internal Marks -40	**External Marks-60**	**Total Marks: 100**

Course Objective:

- To improve understanding of software testing skills- it's purpose, nature, issues and constraints.
- To learn various software testing techniques through case studies.
- To understand the essential characteristics of various automation tools used for testing.

List of Practical's

1. Write a test case based on controls.
2. Test data in a flat file.
3. Manual test case to verify student grade
4. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all Subjects)
5. Write and test a program to login a specific web page.
6. Write and test a program to get the number of list items in a list / combo box.
7. Test a HTML file.
8. Test a program in MS Excel for Data Driven Wizard.
9. Test the addition of two values in C++ Program.
10. Write a test suite containing minimum 4 test cases.

Course Outcomes:

CO1: Apply modern software testing processes in relation to software development and Project management.

CO2: To create test strategies and plans, design test cases

CO3: Prioritize and Execute

CO4: Manage incidents and risks within a project.

Semester-VI	GENDER STUDIES	Course Code: GS
Instruction : 1	Credits: 1	Exam : 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Understand the concepts of gender. • Differentiate women studies from gender studies • Analyze the areas of gender discrimination • Analyze and evaluate the initiative and policies for women empowerment • Remember the women's movements and safe guarding mechanisms	
UNIT	**CONTENT**	**HOURS**
I	**Concepts of Gender:** Sex-Gender-Biological Determination-Patriarchy-Feminism-Gender Discrimination-Gender Division of Labour -Gender stereotyping – Gender Sensitivity-Gender Equity – Equality – Gender Mainstreaming – Empowerment	3
II	**Women‟s Studies Vs Gender Studies:** UGC‟s Guidelines – VII to XI Plans – Gender Studies: Beijing Conference and CEDAW Exclusiveness and Inclusiveness.	3
III	**Areas of Gender Discrimination:** Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment – State Politics and Planning.	3
IV	**WomenDevelopmentandGenderEmpowerment:** Initiatives – International Womens Decade – International Womens Year – National Policy for Empowerment of Women – Women Empowerment Year 2001	3

	– Mainstreaming Global Policies.	
V	**Women‟s Movements and Safeguarding Mechanism:** In India National / State Commission for Women (NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73rdAmendment for PRIs.	3

Reference Book:

Manimekalai. N & Suba. S (2011), Gender Studies, Publication Division,Bharathidasan University, Tiruchirappalli,Jane, P. & Imelda, W. (2004), 50 Key Concepts in Gender Studies

Course Outcomes:

On completion of the Course, the learner will be able to

CO1: Evaluate the concepts of gender discrimination.

CO2: Compare women‟s studies with gender studies.

CO3: Describe the areas of gender discrimination.

CO4: Evaluate the initiative and policies for women empowerment.

CO5: Explain the different women movement.

Mapping of COs with POs & PSOs:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated
M - Moderately Correlated
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