

Course Code		Title	
20U3CAE611		Bioinformatics	
Semester: VI	Credits - 4	CIA:25 Marks	ESE:75 Marks

Course Objective: To explore the functional areas of Bioinformatics and to be familiarized with Biological Databases.

Course Outcomes (CO):

CO1	To Understand the basic concepts of Bioinformatics and its applications.
CO2	To interpret various Biological Databases.
CO3	To learn about the various file formats and data representation standards
CO4	To Illustrate about Database Similarity Searching
CO5	To demonstrate the working nature of sequence alignment

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
I	Bioinformatics: Introduction to Bioinformatics – Goal – Scope – Applications – Limitations –DNA Sequence Analysis: Why analyses DNA? – Gene Structure & DNA Sequence – Features of DNA Sequence Analysis. Examples of related tools and software.Data generation; Generation of large scale molecular biology data.		
Instructional Hours			18
II	Introduction to data types and Source: Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. Introduction to Biological Databases: Types of Database – Biological Database – Pitfalls of Biological Database – Information retrieval from Biological databases. Nucleic acid databases ,Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: Structure databases		
Instructional Hours			18
III	Format and Annotation: Conventions for databases indexing and specification of search terms; Common sequence file formats; Files for multiple sequence alignment; Files for structural data; Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt). Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search. The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts.		
Instructional Hours			18

IV	Database Similarity Searching: Unique Requirements of database searching – Heuristic database searching – Basic local alignment search tool (BLAST) – FASTA – Comparison of FASTA & BLAST – Database searching with smith – waterman method.		
Instructional Hours			18
V	Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm). Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization. Representation of patterns and relationship: Regular Expression, Hierarchies, and Graphical models.		
Instructional Hours			18
Total Hours			90

Text Book(s):

1. JinXiong “ **Essential Bioinformatics**”, Cambridge University Press 2016
2. T K Attwood & D J Parry Smith, “**Introduction to Bioinformatics**”, Pearson Education 2007

Reference Book(s):

1. Jean-Michel Claverie , Cedric Notredame **Bioinformatics – A Beginner’s Guide** Wiley Computer Publishing 2009.
2. ShubaGopal, Rhys Price Jones,PaulTymann,AnneHaake “**Bioinformatics with fundamentalsof Genomics and Proteomics**” Tata McGraw Hill 2010

Tools for Assessment (25 Marks)

CIA I	CIA II	Model	Assignment	Seminar/Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	M	H	H	H
CO 2	H	H	H	S	H
CO 3	H	H	M	H	H
CO 4	H	H	H	M	H
CO 5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U3CKE501	Elective Paper I : Block Chain Technology (Common to CS/CA/IT/CT)		
Semester: V	Credits: 4	CIA : 25 Marks	ESE:75 Marks

Course Objective:

To understand the Block chain technology and explain about the Block chain technology Techniques.

Course Outcomes (CO):

CO1	Understand emerging abstract models for Block chain Technology.
CO2	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.
CO3	It provides conceptual understanding of the function of Block chain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
CO4	Apply hyper ledger Fabric and Etheric platform to implement the Block chain Application.
CO5	Understand the role of Block chain technology

Department offered: Computer Science

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
INTRODUCTION TO BLOCKCHAIN			
I	Block chain- Public Ledgers, Blockchain as Public Ledgers -Bitcoin, Blockchain 2.0, Smart Contracts,Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain -Cryptocurrency to Blockchain 2.0 - Permissioned Model of Block chain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree	1	1
Instructional Hours			18
BITCOIN AND CRYPTO CURRENCY			
II	A basic crypto currency, Creation of coins, Payments and double spending, FORTH - the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network	1	2
Instructional Hours			18
BITCOIN CONSENSUS			
III	Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned block chain-Distributed consensus in closed environment Paxos	1	3
Instructional Hours			18

DISTRIBUTED CONSENSUS		
IV	RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport- Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance	1 5
Instructional Hours		18
BLOCK CHAIN APPLICATIONS		
V	Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases –Finance	1 7
Instructional Hours		18
Total Hours		90

Text Book(s):

1. Bashir, Imran ,**Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks**,2017.

Unit I: Sections: 1.1 to 1.6 (Chapter 1)

Unit II: Sections: 2.1 to 2.5 (Chapter 2)

Unit III: Sections: 3.1 to 3.8 (Chapter 3)

Unit IV: Sections: 5.1 to 5.4, 5.8 (Chapter 5)

Unit V: Sections: 7.1 to 7.5 (Chapter 7)

Reference Book(s):

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. **Bitcoin and cryptocurrency technologies: a comprehensive introduction**. Princeton University Press, 2016.

2. Joseph Bonneau et al, **SoK: Research perspectives and challenges for Bitcoin and cryptocurrency**, IEEE Symposium on security and Privacy, 2015.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Quiz		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	M	M	M
CO 3	M	H	H	H	H
CO 4	M	H	H	H	H
CO 5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
18U3CKE503	Elective Paper - I Internet of Things		
Semester: V	Credits: 4	CIA:25 Marks	ESE: 75 Marks

Course Objective:

To understand the Data and Knowledge Management and use of Devices in IoT Technology, Understand State of the Art – IoT Architecture and Real World IoT Design.

Course Outcomes(CO):

CO1	Understand the vision of IoT from a global context.
CO2	Understand the Market perspective of IoT.
CO3	Understand Use of Devices, Gateways and Data Management in IoT.
CO4	Build state of the art architecture in IoT.
CO5	Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Offered by: CS/CA/IT/CT

Course Content

Instructional Hours / Week: 6

Unit	Description	Text Book	Chapter
I	M2M to IoT -The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.	1	2
Instructional Hours			18
II	M2M to IoT – A Market Perspective – Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview – Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	1	3-4
Instructional Hours			18
III	M2M and IoT Technology Fundamentals - Devices and gateways, Local and wide area networking, Data management.	1	5
Instructional Hours			18
IV	Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.	1	5
Instructional Hours			18
V	IoT Architecture-State of the Art – Introduction, State of the art. Architecture Reference Model - Introduction, Reference Model and architecture, IoT reference Model.	1	6-7
Instructional Hours			18
Total Hours			90

Textbooks:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, Academic Press, 2014.
2. https://www.tutorialspoint.com/internet_of_things/index.htm

Reference Books:

1. Vijay Madiseti and ArshdeepBahga, **“Internet of Things (A Hands-on-Approach)”**, VPT, 2014.
2. Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, Apress Publications, 2013

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	M	M	M
CO 3	M	H	H	H	H
CO 4	M	H	H	H	H
CO 5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
19U3CAE610	Elective Paper III: Software Project Management		
Semester VI	Credits 4	CIA:25 Marks	ESE:75 Marks

Course Objective:

- To understand and develop projects and also solve problems in software project management.
- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.

Course Outcomes(CO):

CO1	Remember the importance of Software Project Management
CO2	Understand the Software approaches, Estimation and Software Quality
CO3	Apply activity planning and resource allocation
CO4	Analyze , Interpret, Contrast and compare managing peoples
CO5	Understand the Software Quality and Management

Offered by: Computer Application**Course Content****Instructional Hours/Week: 6**

Unit	Description	Text Book	Chapter
I	Introduction to Software Project Management: Introduction – why is software project management importance – Project – s/w projects versus other types of project – Activities covered by s/w project management – Some ways of categorizing s/w projects – Management – Problems with s/w projects – Overview of Project Planning. Project Evaluation: Evaluation of individual projects – Technical assessment – Cost benefit evaluation techniques – Risk evaluation.	1	1,2
Instructional Hours			18
II	Selection Approach: Introduction – Choosing technologies – Structure versus speed of delivery – Waterfall model – V-process model – Spiral model. Software Estimation: Basis for s/w estimating – s/w effort estimation techniques – Albrecht function point analysis – COCOMO model. Risk Management: Risk – Categories of risk – Framework – Risk identification – Risk assessment – Risk planning – Risk management – Evaluating risk – Applying PERT technique.	1	4, 5 & 7
Instructional Hours			18
III	Activity Planning: Introduction – Objectives – Project Schedules – Project and Activities – Sequencing and Scheduling activities – Network planning models – Formulating a network model – Forward pass – Backward pass – Identifying critical activities. Resource Allocation: Nature of resources – Identifying resource requirements – Scheduling resources – publishing resource schedule – Cost schedules – Scheduling Sequence.	1	6 & 8
Instructional Hours			18

IV	Monitoring and Control: Creating Framework – Collecting data – Visualizing progress – Cost monitoring – Prioritizing monitoring – Change control. Managing People: Organizational behavior – Selecting right person for the job – Motivation – Oldham-Hackman job characteristics model – Decision Making – Leadership – Organizational structures.	1	9,11
Instructional Hours		18	
V	Software Quality: Introduction – Importance – Definition – ISO 9126 – Practical s/w quality measures Product versus process quality management – Techniques – Quality plans.	1	13
Instructional Hours		18	
Total Hours		90	

Text Book:

1. Bob Hughes, Mike Cotterell, Rajib Mall “**Software Project Management**”, Tata McGraw Hill Education, Fifth Edition, 2011.

Reference Book(s):

1. Kelkar.S.A “**Software Project Management – A Concise Study**”, Prentice Hall of India Publication, Third Edition, 2012.
2. Joel Henry “**Software Project Management A Real World guide to Success**”, Pearson Education Publication, First Edition, 2003.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar / Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	M	M	M	M
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
20U3CAC404/18U3CKC509	Core Paper X - RDBMS and ORACLE		
Semester:IV	Credits: 4	CIA : 25 Marks	ESE: 75 Marks

Course Objective:

To inculcate fundamental knowledge in RDBMS concepts and make them to create, manipulate information with the real time datasets.

Course Outcomes (CO):

CO1	Remember the Data types and fundamentals of database.
CO2	Understanding the concept of Database and Various queries in SQL , PL/SQL
CO3	Applying the concept in various tables to retrieve information.
CO4	Analysing the different types of queries in SQL.
CO5	Able to evaluate the errors in SQL & PL/SQL statements.

Offered by: Computer Applications**Course Content****Instructional Hours / Week: 5**

Unit	Description	Text Book	Chapter
I	Introduction: Database - Purpose of Database Systems - Data Models – Database Language – Transaction Management - Overall System Structure.	2,1	1
	A Relational approach: Relationships –Relational Database Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modelling and Normalization: Data Modeling – Dependency – Normal forms – Dependency Diagrams – De-normalization.		
Instructional Hours			15
II	Oracle9i: Oracle9i an introduction – SQL –SQL *Plus Commands – Errors & Help – Alternate Text Editors. Oracle Tables. DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.	1	3,4
Instructional Hours			15
III	Working with Table: Data Management and Retrieval: DML – Adding a new Row/Record – Updating and Deleting an Existing Rows/Records – Retrieving Data from Table -Restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions – Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations	1	5,6
Instructional Hours			15

IV	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	1	10, 11&12
Instructional Hours			15
V	PL/SQL Composite Data Types: Records – Tables. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views	1	13,14
Instructional Hours			15
Total Hours			75

Text Book(s):

1. Nilesh Shah , “**Database Systems Using Oracle**”, 2nd edition, PHI.
2. Abraham Silberschatz, Henry F.Korth, S. Sudarshan , Database system Concepts , 3rd Edition, McGraw – Hill Companies, inc.

Reference Book(s):

1. Arun Majumdar &Pritimoy Bhattacharya, “**Database Management Systems**”, TMH, 2007.
2. Gerald V. Post , “**Database Management Systems**”, 3rd Edition, TMH.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	H	H	M	M
CO 3	M	H	H	H	M
CO 4	M	H	H	H	H
CO 5	M	H	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
18U3CKE504	Elective Paper I Big Data Analytics		
Semester: V	Credits: 4	CIA:25 Marks	ESE: 75 Marks

Course Objective:

To provide an overview of an exciting growing field of big data analytics, analyse big data like Hadoop, NoSql Map-Reduce and learn fundamental techniques and principles in achieving big data analytics

Course Outcome:

CO1	Know about the big data analytics
CO2	Tools in big data analytics using Hadoop
CO3	Data model in big data analytics using NoSql
CO4	Understanding and Know about Map Reduce Programming
CO5	Gain more knowledge about Hadoop streaming with R

Offered by: CS/CA/IT/CT

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
I	INTRODUCTION TO BIG DATA: Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Bigdata Challenges, Case Study of Big Data Solutions.	1	1
Instructional Hours			18
II	HADOOP: Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – History of Hadoop – Hadoop Overview – Hadoop Distributed File System (HDFS) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem	2	2
Instructional Hours			18
III	NoSQL DATA MODEL: Introduction to NoSQL – NoSQL Business Drivers – NoSQL Data Architectural Patterns – Variations of NoSQL Architectural Patterns – Using NoSQL to Manage Big data – Case study of NoSQL	1	3
Instructional Hours			18
IV	MAP REDUCE Programming: Introduction to MapReduce – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression	2	4
Instructional Hours			18

V	Hadoop streaming with R: Understanding the basics of Hadoop streaming – How to run Hadoop streaming with R – Understanding a MapReduce application – Understanding how to code and run a Map-Reduce application – how to explore the output of Map Reduce application	3	4
Instructional Hours			18
Total Hours			90

Text Books:

1. Radha Shankarmani, M Vijayalakshmi, “**Big Data Analytics**”,WileyPublications,first Edition 2016
2. Seema Acharya, Subhashini Chellappan, “**Big Data and Analytics**”, Wiley Publication, first edition. Reprint in 2016
3. Vignesh Prajapati, “**Data analytics with R and Hadoop**” , Copyright © 2013, Packt Publishing.

Reference Books:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, “**Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses**”, Wiley, 2013
2. Bill Franks, Taming,“**The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics**”, Wiley

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	H	H	H
CO 3	H	M	H	H	H
CO 4	H	H	H	H	H
CO 5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
19U3CKE605	Elective Paper II - Software Quality Assurance (Common to CS/CA/IT/CT)		
Semester: VI	Credits: 4	CIA:25 Marks	ESE: 75 Marks

Course Objective:

To describe Quality Assurance, understand quality components and apply the quality models.

Course Outcomes (CO):

CO1	Knowledge about the concept, factors, of Quality Assurance
CO2	Understand various components of Quality Assurance
CO3	Analyze Testing process in Quality Assurance
CO4	Analyze various Software Quality metrics
CO5	Interpret the various on Standards for Software Quality.

Offered by: Computer Science

Course Content

Instructional Hours / Week: 6

Unit	Description	Text Book	Chapter
I	What is Software Quality?: What is software?-Software error, faults and failures-Classification of the causes of software errors-Software Quality Definition and objectives – software quality assurance and software engineering. Software Quality factors: Need for comprehensive software quality requirements – classification of software requirements into software quality factors – product operation software quality factors- product revision software quality factors – product transition software quality factors.	1	2,3
Instructional Hours			18
II	Components of SQA system : SQA system and architecture – Pre-project components – software project life cycle components – Infrastructure components for error prevention and improvement – Management SQA components – SQA standards, system certification and assessment components – Organizing for SQA – the human components.	1	4
Instructional Hours			18
III	Software testing – strategies: Definition and objectives- software testing strategies – software test classifications – White box testing – Black box testing. Software testing – implementation: Testing process – Test-case Design – Automated testing – Alpha – beta site testing programs.	1	9,10
Instructional Hours			18

IV	Software Quality metrics: Objectives of quality measurement – Classification of software quality metrics – Process metrics- Product metrics- Implementation of Software Quality metrics – Cost of Software Quality metrics-Classical model of Software Quality.	1	21,22
Instructional Hours			18
V	Quality management standards: scope –Main standards of software quality management - ISO 9000-3 – certification according to ISO 9000-3 standard – Capability Maturity model principles, structure and processes area – Bootstrap methodology.	1 2	23 4
Instructional Hours			18
Total Hours			90

Text Books:

1. Daniel Galin, “Software Quality Assurance From Theory to Implementation”, Pearson education Ltd.,2004.
2. Claude Y. Laporte and Alain April, “Software Quality Assurance”, IEEE Press wiley, 2018.

Reference Books:

1. Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, 2nd Edition, Pearson, 2003.
2. Kshirasagar Naik and Priyadarshi Tripathy (Eds), “Software Testing and Quality Assurance: Theory and Practice”, John Wiley, 2008

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	H	H
CO2	M	H	H	H	H
CO3	H	H	M	H	H
CO4	M	M	H	M	H
CO5	M	M	M	M	M

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

Department of Computer Applications

PROGRAMME OUTCOMES

On successful completion of the programme, the graduates will have

PO1	Critical Thinking: Understand the fundamental concepts of Computers, Business environment and IT application and business.
PO2	Design/Development of Solution: Understand & analyze technical data to reach actionable conclusions, including technological solutions to the business.
PO3	Modern Tool Usage: Learn technologies & Programming languages in addressing problems.
PO4	The Social interaction: Develop competent technical writing skills so as to enable the graduate to have effective communication in business.
PO5	Environment and Sustainability: Gain the attitude of continuous learning and deriving innovative ideas.
PO6	Ethics : Apply ethical principle and commit to professional ethics responsibilities as per the norms of the IT industry
PO7	Individual and Team Work : Adopt team building environment and will be a good team player.
PO8	Communication: Create improved communication and business management skills, especially in providing technical support.
PO9	Project management and finance: Attain clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and IT Applications in Business context.
PO10	Lifelong learning: Update technologies continuously.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After the successful completion of the programme, the students are expected to

PSO1	Obtain ability to specify, design, develop, test and maintain usable software systems that behave reliably and efficiently and satisfy all the requirements that customers have defined for them.
PSO2	Gain skill to develop software systems that would perform tasks related to Research, Education and Training and/or E-governance
PSO3	Expertise in determining and optimizing the performance of a given algorithm on a given platform.
PSO4	Acquire capability to anticipate the changing direction of information technology and evaluate and communicate the likely utility of new technologies to an individual or organization
PSO5	Make the students capable in decision making at personal and professional level.

Course Code	Title	
18UCASS01	Self Study Paper	
	Problem Solving and Programming	
	Credit: 1	ESE: 50

Course Objective:

To understand the basic concepts of problem solving approaches and develop optimal program structure using conditional and iterative control structures and functions.

Course Outcomes (CO):

CO1	Able to design a computational solution for a given problem.
CO2	Able to break a problem into logical modules that can be solved (programmed).
CO3	Able to transform a problem solution into programs involving programming constructs.
CO4	To write programs using structures, strings, arrays, pointers and files for solving complex computational problem.

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Offered by: Computer Applications**Course Content**

Unit	Description	Text Book	Chapter
I	Introduction To Computer Problem Solving: Introduction – The Problem Solving aspect – Top down design – Implementation of algorithm – Program Verification – The efficiency of algorithm – The analysis of algorithm.	1	1
II	Programming, Algorithms and Flowcharts: Programs and programming – building blocks for simple programs – programming life cycle phases – pseudo code representation – flow charts – algorithm – programming languages – compiler – interpreter, loader and linker – program execution – classification of programming language – structured programming concept.	2	1
III	Basics of 'C', input / output & control statements: Introduction – identifier – keywords – variables – constants – i/o statements – selection – iteration and repetitive execution – go to statement – nested loops – continue and break statements.	3	2-6
IV	Arrays, Strings, Functions and Pointers: Array – one dimensional characters arrays – multidimensional arrays – array of strings – two dimensional character array – functions – parameter passing mechanism scope – storage classes recursion – comparing iteration and recursion .	3	7-10

	Pointers – pointer operators - uses of pointers – arrays and pointers – pointers and strings – pointer indirection – pointers to functions – dynamic memory allocation.		
V	User-defined data types & files: Structures – initialization – nested structures – structures and arrays – structures and pointers – union – typedef and enumeration types – bit fields – file management in C – files and streams – file handling functions – sequential access file – random access file – command line arguments.	3	13-14

Text Books:

1. R.G.Dromey , “**How To Solve It By Computer**” , Pearson education , fifth edition, 2007.
2. Pradip Dey, Manas Ghosh, “**Fundamentals of Computing and Programming in C**”, First Edition, Oxford University Press, 2009.
3. Kamthane, A.N., “**Programming with ANSI and Turbo C**”, Pearson Education, Delhi,2006

Reference Books:

1. Ashok N Kamthane , “**Programming with ANSI and Turbo C**”, Pearson Edition Publ, 2002.
2. Henry Mullish & Huubert L.Coope, “**The Sprit of C**”, Jaico Pub. House, 1996.

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	H	H	H
CO 2	H	H	H	H	H
CO 3	H	H	H	H	H
CO 4	H	H	H	H	H
CO 5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
19U4CA3ED1	Extra Departmental Course Multimedia Tools		
Semester: III	Credits: 2	CIA: - -	ESE:50 Marks

Course Objective:

To make the students to be a proficient in a broad range of design skills and animation.

Course Outcomes (CO):

CO1	Remember the graphics concepts
CO2	Understand the multimedia tools and techniques
CO3	Apply the graphical designs and functions using Photoshop, CorelDraw and Flash
CO4	Create Professional design & animation
CO5	Create Animated Objects

Offered by: Computer Applications**Course Content****Instructional Hours / Week: 2**

S. No	List of Practical for Photoshop
1	Create Sun Flower using Photoshop.
2	Animate Plane Flying the Clouds using Photoshop.
3	Create Plastic Surgery for Nose using Photoshop.
4	Create See thru text using Photoshop.
5	Create Web Page using Photoshop.
	List of Practical for CorelDraw
6	Create a 3D text in Corel Draw
7	Create a logo for your department in Corel Draw.
8	Create an advertisement for a Textile company in Corel Draw.
9	Using Corel Draw, design a business card for a company.
10	Using Corel Draw, design a banner for a marriage function.
	Total Hours 30

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U3CKC101	Core Paper I - Programming in C		
Semester: I	Credits:4	CIA :25 Marks	ESE:75 Marks

Course Objective:

To develop programming skills using the basics and fundamentals of C programming language and enable effective usage of arrays, structures, pointers and file management.

Course Outcomes:

CO1	Identify the different data types in C programming
CO2	Develop programs using control statements
CO3	Design and implement applications using arrays, strings and functions
CO4	Explain utilization of memory using pointer and file concept
CO5	Design application using sequential and random-access file processing

Offered by: Computer Application

Course Content

Instructional Hours / Week: 4

Unit	Description	Text Book	Chapter
I	Basics of C Programming: History and Features of C - Importance of C – Sample Programs-The Structure of a C Program - Programming Style - Executing C Program - Constants ,Variables and Data Types- Operators and Expression	1	1,2,3
Instructional Hours			12
II	Input – Output Organization: Input and Output Operation – Reading / Writing Character- Formatted input/output Functions- Decision Making and Branching - Decision Making and Looping	1	4,5,6
Instructional Hours			12
III	Arrays, Strings and Functions: One Dimensional - Two Dimensional Arrays –Multi Dimensional Arrays -String operations: length, compare, concatenate, copy–Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion	1	7,8,9
Instructional Hours			12
IV	Structures and Unions: Defining a Structure - Advantage of Structure -Size of Structure - Structures and Functions -Unions Pointers in C: Understanding Pointers –Accessing the Address of a Variable-Declaring Pointer variable- Pointer Expressions-Pointer and Arrays-Pointer and Character Strings-Array of Pointers	1	10,11
Instructional Hours			12

V	File Management in C: Introduction to File Management - Opening/Closing a File – Input / Output operations on Files-Random Access File	1	12
Instructional Hours			12
Total Hours			60

Text Book:

1. E. Balagurusamy , “**Programming in ANSI C**”, Tata McGraw- Hill Publications, Fourth Edition, 2008

Unit I : Sections: 1.1 to 1.9, 2.1 to 2.8, 3.1 to 3.13 (Chapter 1,2 and 3)

Unit II : Sections: 4.1 to 4.5, 5.1 to 5.9, 6.1 to 6.6 (Chapter 4, 5 and 6)

Unit III : Sections: 7.1 to 7.7, 8.1, 8.8.6 to 8.8 (Chapter 7, 8 and 9)

Unit IV : Section: 10.1 to 10.5, 10.9, 11.1 to 11.8 (Chapter 10 and 11)

Unit V : Sections: 12.1 to 12.6 (Chapter 12)

Reference Book(s):

1. Yashwant Kanitkar , “**Let us C**”, BPB publications, Seventh Edition, 2007
2. V. Rajaraman , “**Computer Programming in C**”, PHI publications, First Edition, 2002
3. Byron S. Gottfried, “**Theory and Problems of Programming with C**”, Schaum’s Outline Series, Tata McGraw- Hill Publications, 2006

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	M
CO2	H	H	H	M	M
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
19U3CKC305	Core Paper VII - Operating Systems (Common To CS/CA/IT/CT)		
Semester: III	Credits: 4	CIA:25 Marks	ESE: 75 Marks

Course Objective:

To understand the importance of Operating Systems, its functionalities to manage resources of Computer and Peripherals.

Course Outcomes(CO):

CO1	Recognize the basic concepts of Operating system
CO2	Understand the concepts of processes and scheduling of process.
CO3	Explain the techniques of managing the deadlock and memory
CO4	Illustrate the Segmentation of Paging and Page Replacement policies.
CO5	Apply various file system implementation

Offered by: Computer Science

Course Content

Instructional Hours / Week: 5

Unit	Description	Text Book	Chapter
I	Introduction: Abstract views of an OS – Goals of an OS – OS and the Computer System – Classes of Operating System: Batch Processing systems – Multiprogramming systems – Time sharing systems – Real Time Operating System – Distributed Operating System – Modern Operating systems	1	1,2
Instructional Hours			15
II	Processes and Programs – Programmer View of Process – OS view of Process – Controlling Processes – Process State Transitions – Process Control Block – Process Scheduling: Scheduling Concepts and Terminology – Fundamental Techniques of scheduling – Non Preemptive scheduling policies - Preemptive scheduling policies.	1	3,4
Instructional Hours			15
III	Deadlock: Definition – Deadlocks in Resource Allocation – Handling deadlocks – Deadlock Detection and Resolution - Deadlock Prevention – Deadlock Avoidance. Memory Management: Static and dynamic Memory Allocation – The Memory Allocation Model – reuse of Memory – Contiguous Memory allocation – Non Contiguous Memory Allocation.	1	11
Instructional Hours			15
IV	Paging – Segmentation – Segmentation with Paging. Virtual Memory: Basics – Demand Paging – Overview of Paging – Demand Paging preliminaries – Page replacement policies – Virtual Memory using segmentation	1	5
Instructional Hours			15

V	Layers of the Input Output Control System (IOCS) – Overview of I/O Organization – Disk Scheduling. File systems: File System and IOCS – Files and File Operations – Fundamental File organizations – directory Structures – Case study on LINUX OS ,UNIX OS, Android OS (Self Study)	1	7
	Instructional Hours		15
Total Hours		75	

Text Book:

1. D M Dhamdhare, “**Operating Systems-A concept –Based Approach**”, 2nd Edition,2006.

Reference Books”

1. William Stallings , “**Operating Systems Internals and Design Principles**”, Seventh Edition,Pearson Education Inc.2012.
2. Abraham Silberchatz, Peter Baer Galvin,Greg Gagne, “**Operating System Concepts**”, Seventh Edition, Pearson 2009.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	M	M	H	M	M
CO3	H	H	H	H	M
CO4	H	H	H	M	H
CO5	H	H	M	M	M

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
20U4CAZ301	Skill Based Paper I: Practical in Multimedia and its Applications		
Semester - III	Credits - 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective:

To make the students to be a proficient in a broad range of design skills and animation.

Course Outcomes (CO):

CO1	Remember the graphics concepts
CO2	Understand the multimedia tools and techniques
CO3	Apply the graphical designs and functions using Photoshop, CorelDraw and Flash
CO4	Create Professional design & animation
CO5	Create Animated Objects

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 4

S. No.	List of Practical for Photoshop
1	Combine aspects of several images into one professional images using Photoshop.
2	Animate Plane Flying the Clouds using Photoshop.
3	Create Plastic Surgery for Nose using Photoshop.
4	Create 3D shapes and text using Photoshop
5	Create Web Page using Photoshop.
	List of Practical for CorelDraw
6	Create a 3D text in Corel Draw
7	Create a logo for your department in Corel Draw.
8	Create an advertisement for a Textile company in Corel Draw.
9	Using Corel Draw, design a business card for a company.
10	Using Corel Draw, design a banner for a marriage function.
	List of Practical for Flash
11	Create a shape tween and include guide layer using Flash
12	Create an Advertisement
13	Create a banner Advertisement using Flash
14	Create a story telling and representing animatic using flash.
15	Create an interactive game using Flash ActionScript
	Total Hours 60

Tools for Assessment (30 Marks)

Logical Thinking	Program Execution	Test I	Test II	Observation	Attendance	Total
5	5	5	5	7	3	30

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	S	S	S	S	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U3CAP101	Core Paper III Practical in C Programming		
Semester: I	Credits: 4	CIA: 40 Marks	ESE: 60 Marks

Course Objective:

To make the student learn programming language, problem solving techniques and write program in C language.

Course Outcomes (CO):

CO1	Understand and execute programs in C language
CO2	Experiment with structured programs using control structures and functions
CO3	Develop programs that perform operations using derived data types
CO4	Design applications using sequential and random access file processing
CO5	Applying file concepts to various applications

Offered by: Computer Applications**List of Exercises****Instructional Hours / Week: 4**

S. No.	List of Practical										
1	Write a Program to demonstrate arithmetic operators										
2	Write a Program to demonstrate logical operators										
3	Write Program using decision-making statements										
4	Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows. <table style="margin-left: 40px;"> <thead> <tr> <th>No. of Units Consumed</th> <th>Rate in (Rs)</th> </tr> </thead> <tbody> <tr> <td>1-100</td> <td>2.00 per unit</td> </tr> <tr> <td>101-300</td> <td>3.50 per unit for excess of 100 units</td> </tr> <tr> <td>301-500</td> <td>5.00 per unit for excess of 300units</td> </tr> <tr> <td>501-above</td> <td>9.50 per unit for excess of 500 units</td> </tr> </tbody> </table>	No. of Units Consumed	Rate in (Rs)	1-100	2.00 per unit	101-300	3.50 per unit for excess of 100 units	301-500	5.00 per unit for excess of 300units	501-above	9.50 per unit for excess of 500 units
No. of Units Consumed	Rate in (Rs)										
1-100	2.00 per unit										
101-300	3.50 per unit for excess of 100 units										
301-500	5.00 per unit for excess of 300units										
501-above	9.50 per unit for excess of 500 units										
5	Write a program to perform various string manipulations using built-in functions										
6	Write a Program to demonstrate multidimensional array concept										
7.	Write a program to create structure for an account holder in a bank with following fields: name, account number, address, and balance and display the details of five account holders										
8	Write a program to create structure for an account holder in a bank with following fields: name, account number, address, and balance and display the details of five account holders										

9	Write a program to implement the following concept a) Call By Value B) Call By Reference.
10.	Write a program to implement concept of pointers
11.	Write a program copies the contents of one file to another file

Tools for Assessment (40)

MODEL I	MODEL II	Performance		Observation	Attendance	Total
		Logical Thinking	Optimal Solution			
10	10	5	5	7	3	40

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	M	M
CO3	H	H	H	M	M
CO4	H	H	H	H	H
CO5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code:	Title :		
18U3CAP202	Core Paper VI Practical in C++ Programming		
Semester: II	Credit: 4	CIA : 40 Marks	ESE: 60 Marks

Course Objective:

To make the students understand the Object-Oriented Paradigm, design technique, syntax of C++ and file processing and exception handling techniques.

Course Outcomes(CO):

CO1	List and apply object-oriented features and C++ concepts
CO2	Classify the concepts of friend function, constructors, destructors and polymorphism
CO3	Utilize static member, pointer and virtual function
CO4	Classify the exception handling and templates
CO5	Implement file concepts to save and process data

Offered by: Computer Applications

List of Experiments

Instructional Hours / Week: 4

S. No.	List of Practical
1	Write a C++ Program to illustrate the usage of function using call by reference.
2	Write a C++ Program to illustrate the usage of inline functions
3	Write a C++ Program to illustrate the usage of scope resolution operator.
4	Write a C++ Program to illustrate function overloading
5	Write C++ Programs and incorporating various forms of Inheritance
6	Write a C++ Program to illustrate the use of Constructors and Destructors
7	Write a C++ Program to illustrate friend functions
8	Write a Program to illustrate Static member and methods
9	Write a C++ Program to illustrate the usage of pointers
10	Write a C++ Program to illustrate Virtual functions
11	Write a C++ Program to illustrate the functions of a file.
12	Write a C++ Program to illustrate Exception Handling
	Total Hours: 60

Tools for Assessment (40)

MODEL I	MODEL II	Performance		Observation	Attendance	Total
		Logical Thinking	Optimal Solution			
10	10	5	5	7	3	40

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	M	M	M
CO3	M	M	H	M	H
CO4	H	M	M	H	M
CO5	H	M	M	H	M

S – Strong; H – High; M – Medium; L - Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
20U3CAP303	Core Paper IX : Practical in Java Programming		
Semester: III	Credits: 4	CIA :40 Marks	ESE:60 Marks

Course Objective:

To enable the students to develop problem solving skills and programming ability in Java Language

Course Outcomes (CO):

CO1	Develop the applications using programming concepts
CO2	Demonstrate the creation of objects, classes, methods and inheritance
CO3	Construct Java programs using Exception Handling
CO4	Able to do the AWT controls and Mouse Events in Java
CO5	Implement the concepts to solve the real word problems

Offered by: Computer Applications

Course Content**Instructional Hours / Week: 6**

S. No.	List of Practical
1	Write a Java Applications to extract a portion of a character string and print the extracted String.
2	Write a Java Program to implement the concept of multiple inheritance using Interfaces.
3	Write a Java Program to create an Exception called payout-of-bounds and throw the Exception.
4	Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.
5	Write a Java Program to draw several shapes in the created windows.
6	Write a Java Program to create a frame with four text fields name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its corresponding values are to be appeared in the text fields.
7.	Write a Java Program to demonstrate the Multiple Selection List-box.
8	Write a Java program to import classes from user defined package and creating package.
9	Write a Java Program to create Menu Bars and pull-down menus.
10.	Write a Java Program to create frames which respond to the mouse clicks. For each events with mouse such as mouse up, mouse down, etc., the corresponding message to be displayed.
11	Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click positions.
12	Write a Java Program which open an existing file and append text to that file.
	Total Hours : 90

Tools for Assessment (40 Marks)

Logical Thinking	Program Execution	TEST I	TEST II	Observation	Attendance	Total
5	5	10	10	7	3	40

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	S	H	H	M
CO 2	H	S	H	H	M
CO 3	H	S	H	H	H
CO 4	H	S	H	H	H
CO 5	H	S	H	H	H

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U4CAZ402	Skill Based Paper II: Practical in Web Programming using PHP and MYSQL		
Semester - IV	Credits - 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective:

To make the students to improve the skill set in developing Web sites using the open source software PHP and MySQL.

Course Outcomes (CO):

CO1	To Understand how to code a PHP application and other programming concepts.
CO2	To Understand how to work with arrays and string functions.
CO3	To Create applications using forms, files, sessions and cookies.
CO4	To Design and Implement database applications.
CO5	To Create dynamic web Pages.

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 4

S. No.	List of Practical
1	Write a PHP program to illustrate Conditional and Looping Statements.
2	Write a PHP program to demonstrate Array Functions, string, numeric and date functions.
3	Write a PHP program to create user defined functions.
4	Write a PHP program for file creation and file manipulation.
5	Write a PHP program for creating sessions.
6	Write a PHP program for creating cookies
7	Create a Simple application using forms in PHP
8	Write a PHP program for creating tables with constraints and demonstrate table join.
9	Write a PHP program for Database connectivity , Create,Insertion, Updation and Deletion of rows in MYSQL tables

10	Write a PHP program for sorting and searching a data.
11	Write a PHP Program to illustrate the usage of subqueries ,aggregate functions, set operators.
12	Write a PHP program to create a simple web page. Validate the Input and apply appropriates to format the output.
Total Hours 60	

Tools for Assessment (30 Marks)

Logical Thinking	Program Execution	Test I	Test II	Observation	Attendance	Total
5	5	5	5	7	3	30

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	H	H	H	H	H

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U3MIA202	Allied Paper II : Discrete Mathematics		
Semester: II	Credits : 4	CIA: 25 Marks	ESE: 75 Marks

Course Objective:

To learn about the discrete structures for Computer based applications.

Course Outcome (CO):

CO1	To remember the basic concepts of Set theory
CO2	To understand the basic ideas of Mathematical Logic
CO3	To gain knowledge about different types of Relations and Functions
CO4	To apply the concept of Graph theory in Computer Algorithms

Offered by: Mathematics with CA

Course Content

Instructional Hours / Week: 5

Unit	Description	Text Book	Chapter
I	Set Theory: Introduction-Set & its Elements-Set Description-Types of sets -Venn-Euler Diagrams-Set operations & Laws of set theory.	1	1
	Fundamental products - Partitions of sets – Minsets - Algebra of sets and Duality-Inclusion and Exclusion principle.	1	1
Instructional Hours			15
II	Mathematical Logic: Introduction- propositional calculus – Basic logical operations- Tautologies-Contradiction – Argument - Method of proof - Predicate calculus.	1	12
	Instructional Hours		
III	Relations: Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations.	1	3
	Functions – Types of functions – Invertible functions – Composition of functions.	1	4
Instructional Hours			15
IV	Languages: Operations on languages – Regular Expressions and regular languages.	1	15
	Grammar: Types of grammars – Finite state machine – Finite - State automata.	1	15
Instructional Hours			15
V	Graph Theory: Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs.	1	9
	Trees – Properties of trees – Binary trees – traversing Binary trees – Computer Representation of general trees.	1	10
Instructional Hours			15
Total Hours			75

Text Books:

1. J.K. Sharma, “**Discrete Mathematics**”, Macmillan India Ltd, 2nd edition, 2005.

- Unit I** : Chapter 1, Section: 1.1-1.7, 1.9, 1.10, 1.12, 1.14
Unit II : Chapter 12, Section: 12.1 – 12.3 & 12.8, 12.9 ,12.11,12.12 & 12.14
Unit III : Chapter 3, Section: 3.3 - 3.7, 3.11
 Chapter 4, Section: 4.1 – 4.5
Unit IV : Chapter 15, Section: 15.1-15.7
Unit V : Chapter 9, Section: 9.1 – 9.5
 Chapter 10, Section: 10.1-10.3, 10.6, 10.8

Reference Books:

1. J. P. Tremblay, R Manohar, “**Discrete Mathematics Structures with Applications to Computer Science**”, McGraw Hill International Edition, 2005
2. M. K. Venkataraman, N.Sridharan, N.Chandarasekaran, “**Discrete Mathematics**”, National Publishing Company, Chennai.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	H	M	M
CO2	L	L	H	L	M
CO3	M	M	H	H	H
CO4	L	M	H	M	H

S – Strong; H – High; M – Medium; L - Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
19U3CAE609	Elective Paper III: Artificial Intelligence		
Semester VI	Credits 4	CIA:25Marks	ESE:75 Marks

Course Objective:

To enable the students to understand the Artificial Intelligence as a Problem Solving techniques.

Course Outcomes(CO):

CO1	Knowledge about overview of Artificial Intelligence
CO2	Gain Knowledge about Problem Solving methods
CO3	Understand how to represent Knowledge and its works
CO4	Understand how to use reasoning methods by constructing plans
CO5	Understand methods of Knowledge Generation using Learning

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
I	Introduction: What is AI?- The foundation of AI- AI Problems. Intelligent Agent: Introduction-How Agent should act-Structure of Intelligent Agent	1 2	1,2 1
Instructional Hours			18
II	Problem Solving by searching: Problem Solving Agents- Formulating Problems-Examples: 8 queens problem. Search Strategies- Game Playing: Minim ax-Alpha-Beta Pruning.	1	3,5
Instructional Hours			18
III	Knowledge and Reasoning: A Knowledge based agent- Representation, Reasoning and Logic. Propositional Logic-Very simple Logic- Introduction to First Order Logic.	1	6,7
Instructional Hours			18
IV	Planning: A simple planning agent – From Problem solving to Planning – Basic Representation of Planning – A partial Order Planning Algorithm- Example.	1	11
Instructional Hours			18
V	Learning: A General model of Learning Agent – Inductive Learning – Learning from Decision Trees.	1	18
Instructional Hours			18
Total Hours			90

Text Books:

1. Stuart J.Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Prentice Hall Incorporation.
2. Elaine Rich, Kevin Knight, Shivasankar B.Nair, “Artificial Intelligence”, Third Edition, Tata-McGraw, 2009.

Reference Book:

1. Deepak Khemani, “A First course in Artificial Intelligence”, McGraw Hill Education Pvt Ltd, 2013.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar / Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	S
CO5	H	H	H	H	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
18U3CKC102	Core Paper II - Digital Fundamentals and Computer Architecture		
Semester: I	Credits: 4	CIA : 25 Marks	ESE: 75 Marks

Course Objective:

To enable the students to know about the Operations in digital computer, Boolean algebra, CPU Architecture, memory design and its functionality

Course Outcomes (CO):

CO1	Tell about the basic components of digital computer with its various operations
CO2	Illustrate Boolean algebra and logical circuit diagram
CO3	Organize Input – Output
CO4	Apply priority interrupts and use if for data transfer
CO5	Classify memory organization and multiprocessor in digital computers

Offered by: Computer Applications

Course Content

Instructional Hours / Week: 4

Unit	Description	Text Book	Chapter
I	Digital Logic – Digital Operations - Digital Computers. Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Serial Adder, Half subtractor, Full subtractor, Parallel binary subtractor- Digital Logic: the Basic Gates –NOR, NAND, XOR Gates.	1	1
Instructional Hours			12
II	Combinational Logic Circuits: Boolean algebra -Karnaugh map – Canonical form 1 – Construction and properties –Implicants – Don't care combinations - Product of sum, Sum of products, simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder -Encoder – shift registers-Counters	1	1
Instructional Hours			12
III	Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking- Modes of Transfer	2	11
Instructional Hours			12
IV	Priority Interrupt: Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication-Serial Communication-Character Oriented Protocol, Data Transparency, Bit Oriented Protocol.	2	11
Instructional Hours			12

V	Memory Organization: Memory Hierarchy – Main Memory-Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. Multiprocessor: Interconnection Structure, Interprocessor Arbitration, Interprocessor Communication and Synchronization.	2	12 & 13
Instructional Hours			12
Total Hours			60

Text Book(s):

- V.K. Puri & Henry , “**Digital Electronics Circuits And Systems**” , TMH, 1997.
- M. Morris Mano , “**Computer System Architecture**” , PHI publications,2000.
 - Unit I :** Text book 1: Sections: 1.1.3 to 1.1.8, 1.1.10 – 1.1.14, 1.4.2 to 1.4.5, 1.4.7 to 1.4.9, 1.2.2, 1.2.6 to 1.2.7, 1.2.9 (Chapter 1)
 - Unit II:** Text book 1: Sections: 1.2.1, 1.2.11 to 1.2.15, 1.2.17 to 18, 1.5.1 to 1.5.3, 1.5.6, 1.5.9 to 1.5.10, 1.6.2 to 1.6.9 (Chapter 1)
 - Unit III:** Text book 2: Sections: 11.2 to 11.4 (Chapter 11)
 - Unit IV:** Text book 2: Sections: 11.5 to 11.8 (Chapter 11)
 - Unit V :** Text book 2: Sections: 12.1, 12.2, 12.4, 12.5, 13.2 to 13.4 (Chapter 12 and 13)

Reference Book:

- M. Carter , “**Computer Architecture**”, Schaum‘S Outline Series, TMH, 1996.
- Albert Paul Malvino & Donald P Leach , “**Digital Principles and Applications**”, TMH,2006.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	H	M
CO2	H	M	M	H	M
CO3	H	M	M	H	M
CO4	H	H	M	H	H
CO5	H	H	M	H	H

S – Strong; H – High; M – Medium; L – Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
19U3CKC306	Core Paper VIII Java Programming		
Semester: III	Credits: 4	CIA : 25 Marks	ESE: 75 Marks

Course Objective:

To gain knowledge about basic Java language syntax and semantics to write java programs and understand the principles of classes, methods, inheritance, polymorphism and packages.

Course Outcomes (CO):

CO1	Remember the fundamental concepts of Object-Oriented Programming.
CO2	Understand the different data types and statements.
CO3	Apply the principles of packages and interfaces.
CO4	Illustrate the Concepts of Exception Handling and Multithreading.
CO5	Develop applications using Applet and AWT.

Offered by: Computer Science**Course Content****Instructional Hours / Week: 5**

Unit	Description	Text Book	Chapter
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 – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine-Command Line Arguments.	1	1,2,3
		Instructional Hours	15
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 – Jumps in Loops - Labelled Loops, Classes, Objects and Methods. Arrays: One Dimensional Array-Creating an Array- Two Dimensional Array.	1	4,5,6,7 & 8
		Instructional Hours	15
III	Interfaces: Multiple Interface- Introduction-Defining Interface-Extending Interface-Implementing Interface-Accessing Interface Variables. Packages: Introduction-Java API Packages-Using System Packages-Naming Conventions- Creating Packages - Accessing a Package-Using a Package- Adding a Class to a Package-Hiding Classes-Static Import.	1	10,11 & 12
		Instructional Hours	15
IV	Exception Handling: Fundamentals-Hierarchy of the Exception Classes- Types of Exception –Exception Class-Uncaught Exceptions-Handling Exception-User Defined Exception. Multithreaded Programming: The Java Thread Model-Concept of Thread-Runnable Interface-Thread Class-Thread Creation-Thread's Life Cycle-Thread Scheduling-Synchronization and Deadlock-Inter Thread Communication-Joining Threads-Suspending, Resuming and Stopping Threads.	2	10 & 11
		Instructional Hours	15

V	Input/Output Classes: Input and Output Operations-Hierarchy of Classes in java.io Package-File Class-InputStream and OutputStream Classes-FileInputStream and FileOutputStream Classes-Reader and Writer Classes-RandomAccessFile Class-Stream Tokenizer. Applets: Applet Basics-Applet Life Cycle-Running Applets-Methods of the Applet Class-Graphics Class-Color Class-Font Class-Limitations of Applets. Abstract Window Toolkit: AWT-AWT Classes-Hierarchy of Classes in Java.awt Package-Control Fundamentals-Component Class-Basic Component Classes-Container Class.-Various Container Class.	2	16,18& 19
	Instructional Hours	15	
		Total Hours	75

Text Book(s):

1. E. Balagurusamy, “**Programming with Java – A Primer**”, Tata McGraw Hill Publication, 3rd Edition, 2007
2. ISRD Group, “**Introduction To Object Oriented Programming Through Java**”, Tata McGraw Hill Publication, Forth Reprint 2008.

Reference Book(s):

1. Patrick Naughton & Hebert Schildt, “**The Complete Reference Java 2**”, Tata McGraw Hill Publication, 3rd Edition , 2002
2. John R. Hubbard, “**Programming with Java**”, Tata McGraw Hill Publication, 2nd Edition, 2009

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	M	M	H
CO 2	H	H	M	H	H
CO 3	H	H	H	M	M
CO 4	H	H	H	H	H
CO 5	H	H	H	H	M

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title	
18UCASS02	Self Study Paper	
	Web Design Using HTML	
	Credit: 1	ESE : 50

Course Objective:

To offer students the fundamental knowledge of application development for the internet using HTML.

Course Outcomes(CO):

CO1	Create an HTML Documents and establish adequate formatting for presentation purposes
CO2	Import, insert and modify images and tables
CO3	Establish and maintain internal and external link to available resources
CO4	Use special effect to make the expressive, evocative documents
CO5	Manager forms (Create forms, call programs)

Offered by: Computer Applications**Course Content**

Unit	Description	Text Book	Chapter
I	Introduction to HTML: History of HTML, HTML Generations, HTML Documents, Hyper Links.	1	4,5
II	Head and Body: Header Section, Title, Prologue, Links, Comment lines. Designing the Body Section: Heading Printing, Aligning the Headings, Horizontal Rule, Paragraph, Tab Setting, Images and Pictures.	1	6
III	Ordered and Unordered Listing: Lists, Unordered Lists, Headings in a List, Ordered Lists, Nested Lists. Table Handling: Tables, Table Creation in HTML, Width of the tables and cells, Column Specification, some sample tables.	1	7,8
IV	DHTML and Style Sheets: Defining Styles, Elements of Styles, Linking a style sheet to a HTML Document, In-line Styles, External Style Sheets, Internal Style Sheets, Multiple Styles. Frames: Frameset Definition, Frame definition, Nested framesets.	1	9,10

V	A Web Page Design Project: Frameset definition, Animals, Birds, Fish. Forms: Action attribute, Method attribute, Enctype attribute, Drop Down List, Sample Forms.	1	11,12
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Text Book:

1. C. Xavier , “**World Wide Web Design With Html**”, Tata McGraw Hill Education Private Limited, New Delhi.

Reference Books:

1. Mark Surfas, Mark Brown and John Juge , “**Using Intranet HTML**”, Special Edition.
2. JefDouyer, “**Dynamic HTML Web Magic**”, Hayden development group

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	H	H	H
CO 2	H	H	H	H	H
CO 3	H	H	H	H	H
CO 4	H	H	H	H	H
CO 5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
18U3CKE608	Elective Paper II - Cyber Security		
Semester: VI	Credits: 4	CIA : 25 Marks	ESE:75 Marks

Course Objectives:

- To make the students to understand Cryptography, Cyber crime and its significance in current scenario of IT and information security

Course Outcomes (CO):

CO1	Remember the information and various representation
CO2	Understand the concept of computer networks and overview of internet
CO3	Understand the information storage , data communication and data modulation techniques
CO4	Understand the knowledge about the Cryptography, Cyber Crime and Information Security
CO5	Understand the importance of Information Security Framework

Offered by: Information Technology**Course Content****Instructional Hours / Week: 6**

Unit	Description	Text Book	Chapter
I	Information and its Representation: What is information – Quality - of Information - Value of Information - Information Processing - Information Processing cycle in computers - information - Representation and codes - Number Representation - Binary - Representation of Positive integers - Signed Binary Integers - Positive Binary Fractions - signed Binary Fractions - Representing Fractions in Binary - Representation of Alphanumeric - Data - Current Trends in Information Technology – semiconductor - Technology - Information storage - Networking - Applications of - IT - IT Applications in Business - Modeling and simulation	1	1
Instructional Hours			18
II	Computer Networks and Internet: An overview - What is – computer Network – Basic networking components - what is Internet - Internet Protocols - Internet protocol types - OSI Reference versus TCP/IP Model - OSI model layers - TCP/IP	1	2
Instructional Hours			18
III	Information storage and communication: Information storage - purpose of storage - Types of storage Devices - File organization - Internal file structure - External file structure and file extension - Data communication - an overview - what is data communication - signals - Basic - Data Communication Model - Modulation Techniques.	1	3
Instructional Hours			18

IV	Cryptography Systems: Introduction-Cryptography Systems Types-Symmetric Cryptography - Asymmetric or Public Key, Cryptography-Hash Functions-Why three Encryption Techniques? – Public key Algorithms – RSA Public Key Algorithm – Digital Signature – Diffie – Hellman - ElGamal-EDCSA-XTR. Cyber Law and Ethics: Introduction to cybercrime - Prevention - preventive steps for Individuals - preventive steps for organizations and government - How to protect the computer against threats.	1	5 & 6
Instructional Hours			18
V	Information security Framework - Information security and privacy - security Framework - Information systems security Framework – Framework for Network security access. Access control Techniques- Computer Security and Access Control-Access control Techniques-Biometric Authentication-Authentication Tokens-Token types and usage-Digital signature-Embodiments and vendors-Related Authentication Technologies.	1	8 & 9
Instructional Hours			18
Total Hours			90

Text Book:

1. Pankaj Agarwal, “**Information Security & Cyber Laws**”, Acme Learning Private Limited, First Edition,2010

Reference Books:

1. Amy Rose, Deborah Arrand, Kristin E. Ohlim, Malloy, Michael G. Solomon, Mike Chapple, “**Information Security Illuminated**”, Jones & Barlett Publishers, 2005.
2. Lawrence C. Miller, “**Cyber Security for Dummies**”, John Wiley & Sons, Inc

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	M	M	M
CO 3	M	H	H	H	H
CO 4	M	H	H	H	H
CO 5	H	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U3CKE606	Elective Paper II: Information Security		
Semester: VI	Credits: 4	CIA : 25 Marks	ESE: 75 Marks

Course Objective:

To enable the students to understand various aspects of Information Security in the local and Global scenarios.

Course Outcomes (CO):

CO1	Understand the basics of Information Security
CO2	Identify the legal, ethical and professional issues in Information Security
CO3	Understand the Risk Management Strategy
CO4	Assess the technologies which are essential to provide Information Security
CO5	Understand the Information Security Maintenance model.

Offered by: Computer Applications**Course Content****Instructional Hours / Week: 6**

Unit	Description	Text Book	Chapter
I	Introduction to Information security: History-What is Information Security?-Critical Characteristics of Information, NSTISSC Security Model-Components of an Information System, Securing the Components-Balancing Security and Access-The SDLC-The Security SDLC.	1	1
Instructional Hours			18
II	Need for Security: Introduction- Business Needs-Threats-Attacks.	1	2
	Legal, Ethical and Professional Issues: Introduction-Laws and ethics-types of law-international laws and legal bodies-Ethics and information security.	1	3
Instructional Hours			18
III	Risk Management: Introduction-overview-Identifying and Assessing Risk- Assessing- Control strategies- selecting strategy.	1	4
Instructional Hours			18
IV	Planning for Security: Introduction-Information Security Policy-Blueprint for Security-Security education-training and awareness-Continuity strategies, Risk appetite, Management discussion points, documenting results.	1	5
Instructional Hours			18

V	Implementing Information Security: Introduction- Project management for information security-Technical and non-technical aspects of implementation.	1	10
	Information Security Maintenance: Introduction- Security management models-Maintenance model.	1	12
Instructional Hours			18
Total Hours			90

Text Books:

1. Michael E. Whitman and Herbert J. Mattord, “**Principles of Information Security**”, Second Edition, Thomson Publishers.

Reference Books:

1. Surya Prakash Tripathi and Ritendra Goel, “**Introduction to Information Security and Cyber Laws**”, 2014, Dream Tech Press.
2. V.K. Pachghare, “**Cryptography and Information Security**”, 2nd Revised edition, Prentice-Hall of India Pvt.Ltd.
3. Mark S. Merkow, “**Information Security: Principles and Practices**”, Second Edition, Pearson Education.

Tools for Assessment (25 Marks)

CIA I	CIA 2	CIA 3	Assignment	Seminar / Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	M	H	M	M
CO3	M	H	H	M	H
CO4	H	H	H	H	H
CO5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
20U3CAC506/19U3CAC506	Core Paper: XIII - Software Engineering		
Semester: V	Credits: 3	CIA: 20 Marks	ESE: 55 Marks

Course Objective:

To gain knowledge about basic concepts of Software Engineering and Testing.

Course Outcomes (CO):

CO1	Able to understand the nature of the software and different types of process models
CO2	Gains knowledge about the requirements stage development of the software
CO3	Analyze the different types of architectural designs of the software
CO4	Setting the context on Software Development and Evaluates different testing strategies of the software
CO5	Understand the testing types and test automation

Offered by: Computer Applications

Course Content**Instructional Hours / Week: 5**

Unit	Description	Text Book	Chapter
I	Introduction to Software Engineering: Evolving role of software- Software- The changing nature of Software- Software Myths. A Generic view of Process- A Layered Technology	1	1
	Software Process Models: Prescriptive models- The Waterfall Model - Incremental Process Models- Evolutionary Process Models.	1	3
Instructional Hours			15
II	Requirements Engineering: Requirements Engineering Tasks- Initiating the Requirements Engineering Process- Eliciting Requirements- Building the Analysis Model.	1	7
	Building the Analysis Model: Scenario-Based Modelling- Flow Oriented Modelling.	1	6
Instructional Hours			15
III	Design Engineering: Design Concepts -The design model.	1	9
	Creating an Architectural Design: Representing the System in Context- Defining Archetypes- Refining the Architecture into Components- Describing Instantiations of the System.	1	10
	Modelling Component-Level Design: What is a Component – Designing Class-Based Components.	1	11
	User Interface Design: User Interface Analysis and Design-Interface Design steps.	1	12

Instructional Hours			15
IV	Software Development Life Cycle models: Phases of Software project – Quality, Quality Assurance, Quality control – Testing, Verification and Validation. White-Box Testing- Static Testing – Structural Testing. Black-Box Testing- How to do Black-Box Testing?	2	2,3,4
Instructional Hours			15
V	Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase of Testing – Scenario Testing – Defect Bash. System and Acceptance Testing: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing - Functional testing - Non-functional Testing – Acceptance Testing. Performance Testing: Methodology of Performance Testing – tools for Performance Testing Regression Testing: What is Regression Testing? – Types of Regression Testing. What is Test Automation?	2	5,6,7, 8,16
Instructional Hours			15
Total Hours			75

Text Book(s):

1. Roger S Pressman, “**Software Engineering a Practitioner’s Approach**”, Sixth Edition, McGraw Hill, International Edition, 2013
2. Srinivasan Desikan, Gopalaswamy Ramesh, “**Software Testing Principles and Practices**”, Pearson, 2006.

Reference Books(s):

1. Richard Fairley, “**Software Engineering Concepts**”, Tata McGraw-Hill Publishing Company Limited, 2010.
2. Waman S. Jawadkar, “**Software Engineering – Principles and Practice**”, Tata McGraw Hill Publishing Company Limited, 2011.

Tools for Assessment (20 Marks)

CIA I	CIA II	Model	Assignment	Seminar/Quiz	Attendance	Total
4	4	5	2	2	3	20

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	H	H	M
CO 3	M	H	H	H	M
CO 4	H	M	M	M	M
CO 5	M	H	M	H	H

S-Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

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Course Code	Title		
20U4CAZ503	Skill Based Paper III: Practical in Python Programming		
Semester - V	Credits - 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective:

To develop applications in Python using Procedural statements, Data structures, Regular expressions, Object Oriented Programming concepts and Files to perform various task using Python.

Course Outcomes (CO):

CO1	Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics.
CO2	Apply the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.
CO3	Demonstrate Python regular expression for data verification and utilize matrices for building performance efficient Python programs.
CO4	Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.
CO5	Identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 4

S. No.	List of Practicals
1	Write a Python Program to Explore string functions.
2	Write a python program to make a simple calculator.
3	Write a python program for Linear Search.
4	Write a python program to implement merge sort.
5	Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
6	Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
7	Read a file content and copy only the contents at odd lines into a new file.
8	Create a menu driven Python program with a dictionary for words and their meanings.

9	Using Regular Expressions, develop a Python program to a) Identify a word with a sequence of one upper case letter followed by lower case letters. b) Find all the patterns of “1(0+)1” in a given string. c) Match a word containing ‘z’ followed by one or more o’s. Prompt the user for input.
10	Write a python program to illustrate the concept of inheritance.
11	Write a python program to demonstrate Exception Handling
12	Write a python program to Create Comma Separate Files (CSV), Load CSV files into internal Data Structure.
Total Hours	
60	

Tools for Assessment (30 Marks)

Logical Thinking	Program Execution	Test I	Test II	Observation	Attendance	Total
5	5	5	5	7	3	30

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U4CA3ED2	Extra Departmental Course Practical in Web Development using HTML		
Semester: III	Credits: 2	CIA: - -	ESE:50 Marks

Course Objective:

To enable the student to create the static web pages and web applications.

Course Outcomes (CO):

CO1	Remember about WebPages and Web sites.
CO2	Understand about different HTML Tags
CO3	Apply the tags which they understood to design web pages and web applications
CO4	Analyze the usage of Web tags
CO5	Evaluate website on real world problems according to dynamic content

Offered by: Computer Applications**Course Content****Instructional Hours / Week: 2**

Prog. No.	List of Programs
1	Develop a HTML document which displays the entire header tags, it must open another HTML document.
2	Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.
3	Design a HTML document describing you. Assign a suitable background design and background color and a text color and Image
4	Write a HTML program using Marquee Behavior
5	Write a HTML document to print your class Time Table
6	Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.
7	Design a Html document with link to send e-mail messages.

8	Write a HTML Program to illustrate the ordered list
9	Write a HTML Program to print your Bio-Data in the following format: NAME Religion Community Street Town District State Address PIN Code Office Phone Residence Mobile Educational Qualification Degree University/Institute Month& year Grade / Mark.
10	Develop a HTML document to display a Registration Form for an inter-collegiate function.
Total Hours 30	

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	H	H	H
CO 2	H	H	H	H	H
CO 3	H	H	H	H	H
CO 4	H	H	H	H	H
CO 5	S	S	S	S	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U3CKE502	Elective Paper I NEXT GENERATION NETWORKS (Common to CS/IT/CT/BCA)		
Semester: V	Credit: 4	CIA : 25 Marks	ESE : 75 Marks

Course Objective:

- To learn the technical, economic and service advantages of next generation networks.
- To learn the evolution of technologies of 4G and beyond and to explore the NGN framework catering the services of end user with QoS provisioning.

Course Outcomes (CO):

CO1	Describe the issues and challenges of wireless domain in future generation network design
CO2	Explain the evolution of technologies of 4G and beyond
CO3	Explore the LTE concepts and technologies
CO4	Outline the process of integrating SDN with LTE
CO5	Explain the NGN architectures, management and standardizations

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
I	INTRODUCTION: Evolution of public mobile services - motivations for IP based services, Wireless IP network architecture –3GPP packet data network architecture. Introduction to next generation networks - Changes, Opportunities and Challenges, Technologies, Next Generation Society, future Trends.	2	1,2
Instructional Hours			18
II	4G AND BEYOND: Introduction to LTE-A –Requirements and Challenges, network architectures -mobility management, resource management, services, channel -logical and transport channel mapping, downlink/uplink data transfer, MAC control element, PDU packet formats, scheduling services, random access procedure.	1 2	3 3,4
Instructional Hours			18
III	SDMN-LTE INTEGRATION: SDN paradigm and applications, SDN for wireless-challenges, Leveraging SDN for 5G network Ubiquitous connectivity-mobile cloud-cooperative cellular network-restructuring mobile networks to SDN-SDN/LTE integration benefits.	1	4,5
Instructional Hours			18

IV	NGN ARCHITECTURE: Evolution towards NGN-Technology requirements, NGN functional architecture-Transport stratum, service stratum, service/ content layer and customer terminal equipment function. NGN entities, Network and Service evolution -fixed, mobile, cable and internet evolution towards NGN.	1	4
		2	6
Instructional Hours			18
V	NGN MANAGEMENT AND STANDARDIZATION: NGN requirements on Management-Customer, third party, Configuration, Accounting, performance, device and information management. Service and control management-End-to-End QoS and security. ITU and GSI-NGN releases, ETSI-NGN concept and releases, NGMN alliance and NGMN.	1	7,8,9
		Instructional Hours	
Total Hours			90

Text Books:

1. Jingming Li Salina, Pascal Salina "Next Generation Networks-perspectives and potentials" Wiley, January 2008.
2. Thomas Plavyk, —Next generation Telecommunication Networks, Services and Management, Wiley & IEEE Press Publications, 2010.

Reference Books:

1. MadhusangaLiyanage, Andrei Gurtov, Mika Ylianttila, "Software Defined Mobile Networks beyond LTE Network Architecture", Wiley, June 2015.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	H	H	H	H
CO 3	M	H	H	H	H
CO 4	M	H	H	H	H
CO 5	H	H	H	H	H

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
19U3CAE612	Elective Paper III : Mobile Application Development		
Semester: VI	Credits: 4	CIA : 25 Marks	ESE:75 Marks

Course Objectives:

The aim of course understands the architecture, platform and tools required for mobile application and develop real time mobile application

Course Outcomes (CO):

CO1	Remember the Android SDK and UI Components
CO2	Understand the Icons, Layouts, Menus, Graphics and Animation
CO3	Apply the concepts of Graphics and perform animation
CO4	Analyze the usage and implementation of Android Studio
CO5	Understand Animation and Database

Offered by: Computer Applications

Course Content

Instructional Hours / Week: 6

Unit	Description	Text Book	Chapter
I	Introduction -Getting Started-Downloading and installing Android Studio-Creating an Application-Running the Application on the Emulator-The Application Structure-Debugging Your Application- The Android SDK Manager-Creating an Android Virtual Device. Activities-An Activities Lifecycle-Activity Demo Example- Changing the Application Icon-Using Android Resources-Starting Another Activity-Activity related Intents.	1	1-2
Instructional Hours			18
II	UI Components -Overview-Using the Android studio UI Tool-Using Basic Components-Toast-Alter Dialog-Notifications. Layouts-overview-Linear Layout-Relative Layout-Frame Layout-Table Layout-Grid Layout-Creating a Layout Programmatically. Listeners- Overview-Using the on click Attribute-Implementing a Listener.	1	3-5
Instructional Hours			18
III	The Action Bar: Adding Action Items-Adding Dropdown Navigation-Going Backup. Menus: Overview-The Menu File-The option Menu-The Context Menu-The Popup Menu. List view: Overview-Creating A List Adapter- Using A List View-Extending List Activity and Writing A Custom Adapter-Styling the Selected Item.	1	6-8
Instructional Hours			18

IV	Grid View -Styles and Themes-Bitmap Processing. Graphics and Custom Views-Over View-Hardware Acceleration-Creating a Custom View-Drawing Basic Shapes-Drawing Text-Transparency- Shades-Clipping-Using Paths-The Canvas Demo Application-Fragments.	1	9-13
Instructional Hours			18
V	Multi Pane Layouts-Animation: Overview-Property Animation-An Animation project-Preferences-Working With Files-Overview-Creating a Notes Application-Accessing the Public Storage-Workingwith Database.	1	14-18
Instructional Hours			18
Total Hours			90

Text Book:

1. Budi Kurniawan, **A Beginner's Tutorial, Android Application Development** ,Brainy Software, 2015

Reference Books:

1. Charlie Collins, Michael Galpin, Matthias Kappler, "**Android in Practice**",Manning,2011
2. AnubhavPradhan, Anil V. Deshpande, **Composing Mobile Apps: Learn,Explore, Apply using Android**,Wiley,Publications,2014.
3. Jeff Mcwherter, Scott Gowell, "**Professional Mobile Application Development**" ,Wrox Publisher, 2012

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Quiz		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	H
CO2	M	H	M	H	H
CO3	H	H	M	H	S
CO4	H	H	H	H	S
CO5	S	S	S	S	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
19U3MIA303	Allied Paper III : Operations Research		
Semester: III	Credits : 4	CIA: 25 Marks	ESE: 75 Marks

Course Objective:

To enable the students to learn various mathematical applications in industries, decision making for real time environment.

Course Outcomes(CO):

CO1	To gain knowledge about the basic concepts of the optimal solutions.
CO2	To understand the concepts of Transportation And Assignment Problem.
CO3	To apply the concepts of various Strategies in Game Theory.
CO4	To analyze the concepts of Queuing Theory.
CO5	To find the Critical Path and expected duration for a project.

Offered by: Mathematics

Course Content

Instructional Hours / Week: 5

Unit	Description	Text Book	Chapter
I	Linear Programming: Mathematical Model assumption of linear Programming	1	2
	Graphical method - Principles of Simplex method, Big-M Method, Duality.	1	3, 4, 5
Instructional Hours			15
II	Transportation And Assignment Problem: Assignment and Traveling Salesman Problem.	1	10, 11
Instructional Hours			15
III	Game Theory: Concept of Pure and Mixed Strategies – Solving 2 x 2 matrix with and without saddle point - n x 2 - 2 x m games, Dominance property	1	17
	Replacement models : Elementary replacement models - Present value - Rate of return - Depreciation - Individual replacement – Group replacement.	1	18
Instructional Hours			15
IV	Queuing Theory (Derivations not included): Definition of waiting line model - Queue discipline - Traffic intensity - Poison arrival – Birth death process -	1	20
	Problem from single server: finite and infinite population model – Problems from multi server: finite and infinite population model.	1	20
Instructional Hours			15

V	PERT & CPM: Network representation - backward pass - Forward pass - computation - Pert Network.	1	21, 22
Instructional Hours			15
Total Hours			75

Text Book(s):

- Kanti Swarup, P.K. Gupta, Man Mohan, **Operations Research**, S. Chand & Sons, 1997.
Unit 1: Chapter 2, 3, 4, Section : 4.1, 4.3, 4.4 (Big-M Method only)
Chapter 5, Section: 5.1, 5.2, 5.3, 5.4, 5.7
Unit II: Chapter 10 Section: 10.1, 10.2, 10.3, 10.5, 10.6 10.8, 10.9, 10.10.
Chapter 11
Unit III: Chapter 17, Section: 17.1 – 17.7.
Chapter 18, Section: 18.1 – 18.3.
Unit IV: Chapter 20, Section: 20.1 – 20.4, 20.6, 20.7, 20.8 (Model I, III, V, VI)
Unit V : Chapter 21
Chapter 22, Section: 22.1, 22.2, 22.3.

Reference Book(s):

- Hamdy A Taha, **Operations Research – An introduction**, Prentice Hall of India PVT.LTD, 8th edition, 2008.
- J. K. Sharma, **Operations Research Theory and Applications**, MacMillan India Ltd, 2008.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Problem Solving Skill	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4
CO1	H	M	H	H
CO2	M	M	H	H
CO3	M	M	H	H
CO4	M	H	H	M
CO5	H	H	H	M

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
18U3CKE607	Elective Paper - II Cloud Computing		
Semester: VI	Credits: 4	CIA: 25 Marks	ESE:75 Marks

Course Objectives:

- To make the students to understand the Cloud Computing and types,
- To understand the cloud architecture
- To identify the applications of abstraction & Virtualization
- To apply cloud computing in real-time.

Course Outcomes (CO):

CO1	Understand the basics of Cloud Computing
CO2	Understand the architecture and services of cloud
CO3	Identify the importance of abstraction and virtualization
CO4	Apply the cloud computing for personal and business usage
CO5	Gain knowledge in cloud security

Offered by: Computer Technology

Course Content**Instructional Hours / Week: 6**

Unit	Description	Text Book	Chapter
I	Defining Cloud Computing: Defining Cloud Computing - Cloud Types - Examining the Characteristics of Cloud Computing - Disadvantages of cloud computing - Assessing the Role of Open Standards.	1	1
	Assessing the Value Proposition: Measuring the Cloud's Value : The laws of clouonomics - Cloud computing obstacles - Behavioral factors relating to cloud adoption.		2
Instructional Hours			18
II	Understanding Cloud Architecture : Exploring the Cloud Computing Stack - Connecting to the Cloud.	1	3
	Understanding Services and Applications by Type : Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - Defining Identity as a Service (IDaaS) - Defining Compliance as a Service (CaaS).		4
Instructional Hours			18
III	Understanding Abstraction and Virtualization : Using Virtualization Technologies - Load Balancing and Virtualization - Understanding Hypervisors - Understanding Machine Imaging - Porting Applications.	1	5
	Exploring Platform as a Service: Defining Services - Using PaaS Application Frameworks.		7
Instructional Hours			18

IV	Using Google Web Services: Exploring Google Applications - Surveying the Google Application Portfolio - Exploring the Google Toolkit - Working with the Google App Engine.	1	8
	Using Amazon Web Services : Understanding Amazon Web Services - Amazon Web Service Components and Services - Working with the Elastic Compute Cloud (EC2) - Working with Amazon Storage Systems - Understanding Amazon Database Services.		9
Instructional Hours			18
V	Using Microsoft : Cloud Services - Exploring Microsoft Cloud Services - Defining the Windows Azure Platform - Using Windows Live.	1	10
	Understanding Cloud: Security - Securing the Cloud - Securing Data - Establishing Identity and Presence.		12
Instructional Hours			18
Total Hours			90

Text Book:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley Publishing ,Inc., 2011.

Reference Book(s):

1. Ray J Rafaels, "Cloud Computing : From Beginning to End", 2015.
2. Arshdeep, Bahga and Vijai Madiseti, "Cloud Computing: A Hands-on Approach", 2014.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	H
CO2	H	H	M	H	H
CO3	H	M	M	M	S
CO4	S	H	M	H	S
CO5	H	S	H	H	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
19U3CKC611	Core Paper: XVII - Data Mining (Common to BCA and IT)		
Semester: VI	Credits: 4	CIA : 25 Marks	ESE: 75 Marks

Course Objective:

To enable the students to explore data using data mining techniques to solve the business problems.

Course Outcomes (CO):

CO1	Know basic concept of Data Mining and its Association Rules
CO2	Understand the different types of Clustering
CO3	Apply the learnt method in splitting the data and creating Decision Tree
CO4	Analyse various type of Mining like Web Mining and Text Mining
CO5	Assess knowledge of What, When and Where the data applied

Offered by: Computer Applications**Course Content****Instructional Hours / Week: 6**

Unit	Description	Text Book	Chapter
I	Introduction and Association Rules : Introduction- What is Data Mining – Data Mining Definition – KDD Vs Data Mining – DBMS Vs Data Mining – Data Mining Techniques – Data Mining Application Areas. Association Rules- What is Association Rules - Methods to Discover Association rules – A Priori Algorithm – Partition Algorithm – Pincer Search Algorithm.	1	3, 4
Instructional Hours			18
II	Clustering Techniques: Introduction - Clustering Paradigms – Partitioning Paradigm – m k Medoid Algorithm – CLARA – CLARANS – Hierarchical Clustering – DBSCAN – BIRCH – CURE.	1	5
Instructional Hours			18
III	Decision Tree – What is Decision Tree – Tree Construction Principle – Best Split – Splitting Criteria – Decision Tree Construction – CART – ID3 – CHAID – Decision Tree Construction with Pre-sorting.	1	6
Instructional Hours			18
IV	Web Mining – Web Content Mining – Web Structure Mining – Web Usage Mining. Text Mining – Unstructured Text - Episode Rule Discovery for Texts – Hierarchy of Categories – Text Clustering.	1	8
Instructional Hours			18

v	Temporal and Spatial Data Mining: What is Temporal Data Mining – Temporal Association Rule – Sequence Mining – GSP Algorithm. Spatial Mining – Spatial Mining Tasks – Spatial Clustering – Spatial Trends.	1	9
Instructional Hours			18
Total Hours			90

Text Book(s):

1. Arun K Purari, **Data Mining Techniques**, Published by University Press India Private Limited.

Reference Book(s):

1. Soman, Diwakar and Ajay, **Insight into Data Mining Theory and Practice**, Published by Prentice Hall of India Private India.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar/Quiz		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	M	M	M
CO 2	M	M	M	H	H
CO 3	H	H	H	H	H
CO 4	H	H	H	H	H
CO 5	H	H	H	H	H

S - Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U3CAC507/19U3CAC404	Core Paper XIV: Visual Programming		
Semester: V	Credits: 4	CIA: 25 Marks	ESE:75 Marks

Course Objectives:

- To understand the concept of GUI Design Tool, also to make them aware of controls in VB.NET.
- Code programs and develop interface using Visual Basic .NET.

Course Outcomes (CO):

CO1	Remember the .Net Framework and Controls
CO2	Understand the Structures and OOPs Concepts
CO3	Develop and implement windows, console and web-based application
CO4	Examine webpage, file management, ADO.Net for Database Connection
CO5	Understand and ability to design ASP Page

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 5

Unit	Description	Text Book	Chapter
I	What is .Net? – An Overview of the .Net Framework- The Common Language Runtime – The.Net Class Framework. Introduction VB.Net: Visual Studio.Net – Working with VB.Net – Variables and Types: Difference of value and Reference Types – Value Types – explicit Conversion – Reference Types.	1	1,2,4
	Instructional Hours		15
II	Object Syntax Introduction: Object Oriented Terminology – Working with objects- Creating Classes – Advanced Concepts. Inheritance and Interface: Inheritance – Multiple Inheritance - Abstraction – Encapsulation – Polymorphism – What is Namespace? - Exception in .Net – Structured Exception Handling Keywords in VB.Net.	1	5,6,7,8,9
Instructional Hours			15
III	Windows Forms: Forms as classes – Forms at Design Time – Forms at Runtime - Controls – Data Access with ADO.Net: why do we need ADO.Net? – The ADO.Net Architecture - .Net Data Provider – The Dataset Component.	1	11,12
Instructional Hours			15

IV	What is ASP.Net? – Setting up for ASP.Net – An Overview Programming Basics – Basics of Programming – ASP.Net Data types – Operators – Common ASP.Net Page Syntax – Built-in ASP.Net objects and interactivity- The Response object – The ASP Server object.	2	1,2,3
Instructional Hours			15
V	Web Forms and ASP.Net – Web Forms – ASP.Net and Configuration – ASP.Net and state- The Application Scope – ASP Sessions – The Session Object – The Scripting Object Model – Active Server Components and Controls– More Active Server Component.	2	4,5,6
Instructional Hours			15
Total Hours			75

Text Book(s):

1. Bill Evjen, Billy Hollis, Rockford Lhotka, Tim McCarthy, Jonathan Pinnock, Rama Ramachandran, Bill Sheldon, “**Professional VB.Net 2003**”, Wiley India Edition, Reprint 2007.
2. Dave Mercer, “**ASP.Net: A Beginner’s Guide**”, Tata McGraw Hill, Fifth Reprint 2008.

Reference Book(s):

1. Peter Aitken’s “**Visual Basic .Net Programming**”, Dreamtech Press, Reprint 2004.
2. Steven Holzner, “**Visual Basic .Net Programming**”, Dreamtech Press, 2005 Edition.
3. Mridula Parihar, “**ASP.Net Bible**”, Wiley India Edition, Reprint 2007.
4. George Shepherd, “**Microsoft VB.Net 2.0**”, Prentice Hall, 2005.

Tools for Assessment (25 Marks)

CIA I	CIA 2	CIA 3	Assignment	Seminar/ Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	M	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	S	S	H	H	S

S-Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by

Course Code		Title	
20U3CAC508		Core Paper XV - Problem Solving with Python	
Semester: V	Credits 3	CIA:20 Marks	ESE:55 Marks

Course Objective: To acquire programming skills in Python and to develop ability in writing applications using Python.

Course Outcomes (CO):

CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
CO2	Understand about how to program python using strings and functions .
CO3	Apply the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
CO4	Able to write programs by applying the commonly used operations involving file systems and regular expressions.
CO5	Develop applications by applying the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism .

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 5

Unit	Description	Text Book	Chapter
I	Introduction : Introduction to Python, Origin, Comparison, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, Control Flow Statements: The continue and break Statements, Exception Handling, Functions: Built-In Functions, User defined Functions, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, Command Line Arguments.		
Instructional Hours			15
II	Python Objects: Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Unsupported Types. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Strings: Creating Strings, Basic String Operations, String Methods, Formatting Strings, Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, Turtle Graphics – Turtle attributes.		
Instructional Hours			15
III	Dictionaries : Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, Tuples and Sets: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.		
Instructional Hours			15

IV	Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, Regular Expression Operations , Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.Special Symbols and Characters for REs, REs and Python		
Instructional Hours			15
V	Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.		
Instructional Hours			15
Total Hours			75

Text Book(s):

1. Y.Daniel Liang, “Introduction to Programming using Python”, Pearson India, Third Impression, 2018.
2. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.

Reference Book(s):

1. Mark Lutz , “Learning Python: Powerful Object-Oriented Programming”,O’Reilly,Fifth Edition,2013.
2. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015

Tools for Assessment (20 Marks)

CIA I	CIA II	Model	Assignment	Seminar/Quiz	Attendance	Total
4	4	5	2	2	3	20

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	M	H	H	H
CO 2	M	H	H	S	H
CO 3	H	H	M	H	H
CO 4	H	S	H	M	H
CO 5	S	H	H	H	M

S- Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U3CAP405	Core Paper XII : Practical in Oracle Programming		
Semester: IV	Credits: 4	CIA : 40 Marks	ESE: 60 Marks

Course Objective:

To make the students to understand Relational Database Management System concepts using Oracle and able to do the various operations on Tables.

Course Outcomes (CO):

CO1	Remember to transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a RDBMS.
CO2	Understand the processes of Database Development and Administration using SQL and PL/SQL.
CO3	Apply the Programming and Software Engineering skills and techniques using SQL.
CO4	Analyze the relational data model with optimal and feasible solutions
CO5	Evaluate the Optimal Solutions

Offered by: Computer Applications

Course Content

Instructional Hours / Week: 6

Prog. No.	List of Programs
1	Create a table for Employee details with Employee Number as primary key and following fields: Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping operators.
2	Create tables for library management system which demonstrate the use of primary key and foreign key. Master table should have the following fields: Accno, Title, Author and Rate. Transaction table should have the following fields: User id, Accno, Date of Issue and Date of Return. Create a Report(Select verb) with fields Accno, Title, Date of Issue for the given Date of Return with column formats.
3	Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block.
4	Write a PL/SQL program to check whether given string is palindrome or not
5	Write a PL/SQL program to find factorial of numbers using function and procedure.
6	Create a PL/SQL Program to perform updation using various triggers.

7	Create a database trigger to implement on master and transaction tables which are based on inventory management system for checking data validity. Assume the necessary fields for both tables.
8	Write a PL/SQL to split the student table into two tables based on result (One table for —Pass and another for —Fail). Use cursor for handling records of student table.
9	Write a PL/SQL to raise the exceptions in Bank Account Management table
10	Write a PL/SQL to handle package
11	Write a PL/SQL Cursor for referencing fields in a record
12	Write a PL/SQL trigger for entering mark in the student table
Total Hours	
90	

Tools for Assessment (40 Marks)

Logical Thinking	Program Execution	TEST I	TEST II	Observation	Attendance	Total
5	5	10	10	7	3	40

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	H	H	H
CO 2	H	H	H	H	H
CO 3	H	H	H	H	H
CO 4	H	H	H	H	H
CO 5	H	H	H	H	S

S- Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code	Title		
18U3CKC203	Core Paper IV - C++ Programming		
Semester: II	Credits: 4	CIA : 25 Marks	ESE:75 Marks

Course Objective:

To make the students understand the Object Oriented Paradigm, design technique, syntax of C++ and file processing and exception handling techniques.

Course Outcomes(CO):

CO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
CO2	Understand the concepts of functions, Classes and Objects.
CO3	Apply inheritance concepts and understand of early and late binding, usage of exception handling
CO4	Implement compile time polymorphism
CO5	Interpret and design the exception handling techniques for resolving run-time errors and handle large data set using file I/O

Offered by: Computer Applications

Course Content

Instructional Hours / Week: 4

Unit	Description	Text Book	Chapter
I	Fundamentals – Basic Concepts of Object–Oriented Programming – Benefits of OOP– Object oriented Languages – Applications of OOP What is C++?- Applications of C++- A simple C++ Program- Structure of C++- I/O Statements- Creating the source file- Compiling and Linking- Tokens- Keywords- Identifiers and Constants- Basic Datatypes- User defined Datatypes- Derived Datatypes.	1	1,2,3
Instructional Hours			12
II	Expressions and Control Structures- Declaration of variables-Operators in C++- Scope Resolution Operator- Manipulators-Expressions in C++- control structures. Functions-The Main Function- Function Prototyping- Call by reference- return by reference- Inline functions.	1	3,4
Instructional Hours			12
III	Classes and Objects - Specifying a class- Defining member functions- A C++ Program with class-Private Member Functions- Static Data Members- Static Member Functions- Friend Functions. Constructors and Destructors-Parameterized Constructor-Copy Constructor- Constructors with Default arguments- Dynamic Constructors- Destructors.	1	5,6
Instructional Hours			12

IV	Operator Overloading- Defining- Unary Operator Overloading- Binary Operator Overloading-Type Conversions -Inheritance - Introduction- Defining Derived classes-single-multilevel-multiple-Hierarchical-Hybrid Inheritance. Pointers- Pointers to Objects- Pointers to derived classes- Virtual Functions.	1	7,8,9
Instructional Hours			12
V	Working With Files- Classes for file Stream Operations- Opening and closing a file – Detecting EOF – File modes- Sequential Input-Output Operations- -Command Line arguments- Exception Handling-Basics- Exception Handling Mechanism- Throwing Mechanism- Catching Mechanism.	1	11,13
Instructional Hours			12
Total Hours			60

Text Book:

1. E.Balagurusamy,**Object–Oriented Programming with C++**, Tata McGraw- Hill Publications, Sixth Edition, 2013.

Unit I : Sections: 1.4 to 1.8, 2.1 to 2.8, 3.2 to 3.7(Chapter 1,2 and 3)

Unit II : Sections: 3.10, 3.13 to 3.14, 3.17, 3.19, 3.24, 4.2 to 4.6 (Chapter 3 and 4)

Unit III : Sections: 5.3 to 5.5, 5.8, 5.11 to 5.12, 5.15, 6.3,6. 5, 6.7, 6.8, 6.11(Chapter 5 and 6)

Unit IV : Sections: 7.2 to 7.4, 7.8,8.1 to 8.3,8.5 to 8.8,9.2,9.4 to 9.5 (Chapter 7,8 and 9)

Unit V : Sections: 11.2 to 11.5, 11.7, 11.10, 13.1 to 13.5 (Chapter 11, 13)

Reference Book(s) :

1. Kamthane, **Object Oriented Programming with ANSI and Turbo C++**, Person Education, 2016.
2. John R Hubbard, **Programming with C++**, Tata McGraw- Hill Publications, Second Edition, 2015.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	H	H
CO2	H	H	M	M	M
CO3	H	H	M	M	M
CO4	H	H	H	M	M
CO5	H	H	H	M	M

S – Strong; H – High; M – Medium; L - Low

Course Designed by	Verified by	Checked by	Approved by

Course Code		Title	
18U3CKC408	Core Paper XI: Computer Networks (Common to CS,CA,CT,IT)		
Semester - IV	Credits - 4	CIA:25 Marks	ESE:75 Marks

Course Objective:

To inculcate knowledge on Networking concepts and technologies like wireless, Broadband and Bluetooth.

Course Outcomes (CO):

CO1	Understand about network hardware, software and uses of computer networks
CO2	Understand Guided Transmission Media, Wireless Transmission, and Communication Satellites
CO3	Understand error detection and correction, elementary data link protocol
CO4	Apply various Transport Protocols and Routing algorithms
CO5	Understand the concept of DNS and Cryptography

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 6

Unit	Description	Text Book	Chapter
I	Uses of computer networks: Business Applications- Home Applications - Mobile Users - and Social Issues. Network Hardware: Personal Area Networks - Local Area Networks - Metropolitan Area Networks - Wide Area Networks, Internetworks. Network software: Protocol Hierarchies - Design Issues for the Layers - Connection-Oriented Versus Connectionless Service - Service Primitives - the Relationship of Services to Protocols - Reference models: The OSI Reference Model - The TCP/IP Reference Model- A Comparison of the OSI and TCP/IP Reference Models.	1	1
Instructional Hours			18
II	Physical Layer - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum –Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary - Medium-Earth Orbit - Low Earth-orbit Satellites – Satellites versus Fiber.	1	2
Instructional Hours			18
III	Data link Layer: Services Provided to the Network Layer – Framing- Error Control - Flow Control. Error detection and Correction: Error-Correcting Codes - Error-Detecting Codes. Elementary data link Protocols: A Utopian Simplex Protocol- A Simplex Stop-and-Wait Protocol for an Error-Free Channel- A Simplex Stop-and-Wait Protocol for a Noisy Channel. Sliding Window Protocols: One-Bit sliding window protocol – A protocol using Go-Back-N – A Protocol using Selective Repeat.	1	3
Instructional Hours			18

IV	Network layer: Routing algorithm -The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Anycast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks, Transport layer: Elements of transport protocols -Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Crash Recovery The Internet Transport Protocols UDP: Introduction to UDP. TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window, TCP Timer Management, TCP Congestion Control.	1	5,6
Instructional Hours			18
V	Application layer: DNS—The Domain Name System, The DNS Name Space, Domain Resource Records, Name Servers, Electronic mail -Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, Network Security: Cryptography -Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, Two Fundamental Cryptographic Principles.	1	7,8
Instructional Hours			18
Total Hours			90

Text Book:

1. Andrew S. Tanenbaum; “**Computer Networks**”, 4th edition, PHI

Reference Books:

1. Achyut Godbole, “**Data Communication and Networks**”, 2007, TMH.
2. Uyles Black, “**Computer Networks: Protocols, Standards, and Interfaces**”, 2nd ed., PHI

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	M	M	M	M
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	H	H	H	S	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3CAP509	Core Paper XVI: Practical in Visual Programming		
Semester: V	Credits: 4	CIA : 40 Marks	ESE: 60 Marks

Course Objectives:

- To inculcate the programming algorithm, process, and structure of VB.Net and ASP.Net.
- To demonstrate the connectivity from VB.Net and ASP.Net to MS Access and Oracle.

Course Outcomes (CO):

CO1	Remember the various Controls.
CO2	Understand the methods and properties of Controls.
CO3	Apply the structure to design window based and Web Base Applications.
CO4	Analyze the optimal and feasible solution.
CO5	Evaluate the feasibility of the solution to be implemented.

Offered by: Computer Applications

Course Content

Instructional Hours / Week: 5

Prog. No.	List of Programs
1	Write VB.Net program to develop a calculator with basic operations.
2	Write VB.Net program to create menus in a form using menu editor.
3	Design a form in VB.Net using common dialog control to display the save and open dialog box.
4	Write VB.Net program to maintain student mark list using MS Access
5	Write VB.Net program for a various font application
6	Write VB.Net program to use a tool bar to set editor properties.
7	Write VB.Net program to create and reading text file.
8	Write VB.Net program to implement a binary search using collection class.
9	Design College Website using ASP.Net.
10	Write ASP.Net Program to create online examination system.
11	Write ASP.Net Program to develop website for online mobile shop.
12	Design Online Registration Form using ASP.Net
	Total Hours
	75

Tools for Assessment (40 Marks)

Logical Thinking	Program Execution	TEST I	TEST II	Observation	Attendance	Total
5	5	10	10	7	3	40

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	H	H	H	H
CO 2	H	H	H	H	H
CO 3	H	H	H	H	H
CO 4	S	S	S	S	S
CO 5	S	S	S	S	S

S - Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Scheme of Examination

(Applicable to the students admitted during the year 2020-2021)

BACHELOR OF COMPUTER APPLICATIONS

SEMESTER	Part	Course Code	Name of the Course	Instruction hours / week	Examination				Credits
					Duration Hours	CIA	ESE	Total	
I	I	18U1TAM101/ 18U1HIN101/ 18U1MAL101/ 20U1FRN101	Language - I	5	3	25	75	100	4
	II	20U2ENG101	English – I	5	3	25	75	100	4
	III	18U3CKC101	Core Paper I: Programming in C	4	3	25	75	100	4
	III	18U3CKC102	Core Paper II: Digital Fundamentals and Computer Architecture	4	3	25	75	100	4
	III	18U3CAP101	Core Paper III: Practical in C Programming	4	3	40	60	100	4
	III	18U3MIA101	Allied Paper I: Mathematics for Computer Science	5	3	25	75	100	4
	IV	18U4ENV101	Ability Enhancement Compulsory Course: Environmental Studies	2	3	-	50	50	2
	IV	18U4HVY201	Value Education: Human Values and Yoga Practice I	1	-	-	-	-	-
				30				650	26
II	I	18U1TAM202/ 18U1HIN202/ 18U1MAL202/ 20U1FRN202	Language - II	5	3	25	75	100	4
	II	20U2ENG202	English - II	5	3	25	75	100	4
	III	18U3CKC203	Core Paper IV: C++ Programming	4	3	25	75	100	4
	III	18U3CKC204	Core Paper V: Data Structures	4	3	25	75	100	4
	III	18U3CAP202	Core Paper VI : Practical in C++ Programming	4	3	40	60	100	4
	III	18U3MIA202	Allied Paper II : Discrete Mathematics	5	3	25	75	100	4
	IV	18U4HRC202	Ability Enhancement Compulsory Course: Human Rights and Constitution of India	2	3	-	50	50	2

	IV	18U4HVY201	Value Education: Human Values and Yoga Practice I	1	2	25	25	50	2
				30				700	28
III	III	19U3CKC305	Core Paper VII: Operating Systems	5	3	25	75	100	4
	III	19U3CKC306	Core Paper VIII: Java Programming	5	3	25	75	100	4
	III	20U3CAP303	Core Paper IX: Practical in Java Programming	6	3	40	60	100	4
	III	19U3MIA303	Allied Paper III: Operations Research	5	3	25	75	100	4
	IV	20U4CAZ301	Skill Based Paper I: Practical in Multimedia and its Applications	4	3	30	45	75	3
	IV	19U4NM3BT1 / 19U4NM3AT1 / 19U4NM3CAF / 19U4NM3GTS / 19U4NM3WRT	# @Basic Tamil – I / ##Advanced Tamil – I / * NME: Consumer Affairs / Gandhian Thoughts / Women’s Rights	2	3	50		50	2
	IV	19U4CA3ED1/ 18U4CA3ED2	Extra Departmental Course	2	3	-	50	50	2
	IV	18U4HVY402	Value Education: Human Values and Yoga Practice II	1	-	-	-	-	-
	IV	20U4CAVALC	**Skill Enhancement: Valued Added Course - Institute Industry Linkage	-	-	-	-	-	-
				30				575	23
IV	III	20U3CAC404/ 18U3CKC509	Core Paper X: RDBMS and Oracle	5	3	25	75	100	4
	III	18U3CKC408	Core Paper XI: Computer Networks	6	3	25	75	100	4
	III	20U3CAP405	Core Paper XII: Practical in ORACLE Programming	6	3	40	60	100	4
	III	18U3BAA404	Allied Paper IV: Accounting for Cost & Management	6	3	25	75	100	4
	IV	20U4CAZ402	Skill Based Paper II: Practical in Web Programming using PHP and MYSQL	4	3	30	45	75	3
	IV	19U4NM4BT2 / 19U4NM4AT2 / 19U4NM4GEN	# @Basic Tamil – II / ##Advanced Tamil - II / General Awareness	2	3	50		50	2
	IV	18U4HVY402	Value Education: Human Values and Yoga Practice II	1	2	25	25	50	2
	IV	20U4CAVALC	** Skill Enhancement: Value Added Course - Institute Industry Linkage	-	-	-	-	-	Grade
				30				575	23

V	III	20U3CAC506/ 19U3CAC506	Core Paper XIII: Software Engineering	5	3	20	55	75	3
	III	20U3CAC507/ 19U3CAC404	Core Paper XIV: Visual Programming	5	3	25	75	100	4
	III	20U3CAC508	Core Paper XV: Problem Solving with Python	5	3	20	55	75	3
	III	20U3CAP509	Core Paper XVI: Practical in Visual Programming	5	3	40	60	100	4
	III	20U3CKE501/ 20U3CKE502 18U3CKE503/ 19U3CKE504	Discipline Specific Elective Paper – I	6	3	25	75	100	4
	IV	20U4CAZ503	Skill Based Paper III: Practical in Python Programming	4	3	30	45	75	3
	III	20U3CAV510	In-plant Training	-	-	-	50	50	2
				30				575	23
VI	III	18U3CKC611	Core Paper XVII: Data Mining	6	3	25	75	100	4
	III	20U3CAV612	Core Paper XVIII: Project and Viva- Voce	6	3	40	60	100	4
	III	19U3CKE605/ 18U3CKE606/ 18U3CKE607/ 18U3CKE608	Discipline Specific Elective Paper II	6	3	25	75	100	4
	III	19U3CAE609/ 19U3CAE610/ 20U3CAE611/ 19U3CAE612	Discipline Specific Elective Paper III	6	3	25	75	100	4
	IV	19U4CAZ604	Skill Based Paper IV: Practical in R Programming	6	3	30	45	75	3
	V	19U5EXT601	Extension Activities	-	-	-	-	50	2
				30				525	21
Total				180				3600	144
Additional Credit Optional(II-V)									8^{\$}

Basic Tamil -Students who have not studied Tamil up to 12th standard.

##**Advance Tamil** – Students who have studied Tamil language up to 12th standard and chosen other languages under part I of the UG programme but would like to advance their Tamil language skills.

* **NME** – Student shall choose any one course out of three courses.

@ No End Semester Examinations. Only Continuous Internal Assessment (CIA)

\$ - Not included in Total marks and CGPA Calculation

** Examination and Evaluation for value added course shall be conducted by the Industry and the marks shall be submitted to the Controller of Examination for the award of the degree.

ELECTIVE PAPERS:

Elective Papers	Course Code	Name of the Course
Elective Paper I	20U3CKE501	Block Chain Technology
	20U3CKE502	Next Generation Networks
	18U3CKE503	Internet of Things
	19U3CKE504	Big Data Analytics
Elective Paper II	19U3CKE605	Software Quality Assurance
	18U3CKE606	Information Security
	18U3CKE607	Cloud Computing
	18U3CKE608	Cyber Security
Elective Paper III	19U3CAE609	Artificial Intelligence
	19U3CAE610	Software Project Management
	20U3CAE611	Bioinformatics
	19U3CAE612	Mobile Application Development

EXTRA DEPARTMENTAL COURSE

S. No.	Semester	Course Code	Course Title
1	III	19U4CA3ED1	Multimedia Tools
2		18U4CA3ED2	Web Development using HTML

Additional Credit Course

Earning Additional credit course is not mandatory for Course Completion

Additional credits: 10

S. No.	Subject	Credit/ course	Total credits
1	Completion of Certificate Course	1	1
2	Hindi/ other Foreign languages	1	1
3	Self Study Papers	1	2
4	Massive Open Online Courses/Spoken Tutorial prescribed by the Departments	1	3
5	Representation - Sports/Social Activities/ Co curricular/Extracurricular Activities at University/ District/ State/ National/ International levels	1	1
6	Swachh Bharath Summer Internship Programme	2	2
Total			10

Rules: The Students can earn additional credits only if they complete the above during the course period (II to V Sem.) and based on the following criteria. Proof of Completion must be submitted to the Office of Controller of Examinations before the commencement of the VI Semester. (Earning Additional credit course is not mandatory for Course Completion)

1. Students can complete Certification Courses for a minimum of 30hrs (II to V Semester only) from reputed centers and the same certificate shall be produced to earn a credit. They shall be guided by the Department if needed.
2. Students can opt Hindi/ any Foreign Language approved by Certified Institutions to earn one credit. The certificate of Hindi must be obtained from Dakshin Bharat Hindi Prachar Sabha and He/ She has to enroll and complete during their course period (II to V Semester only)
3. Students can earn one credit, if they complete one self study Paper prescribed by the Department. The Departments shall offer two Self Study Papers.

Self Study Paper offered by Department of Computer Application

S. No.	Semester	Course code	Course Title
1	Semester II to V	18UCASS01	Problem Solving And Programming
2		18UCASS02	Web Design Using HTML

4. Students can earn one Credit, if they complete any one MOOC / Spoken Tutorial prescribed by the Department. Students shall earn a maximum of 3 Additional Credits by completing 3 online courses.

List of Online Courses prescribed by Department of Computer Application

1. C Programming
2. Advanced C++
3. Java / NetBeans
4. Python
5. Linux OS

Note: Other than the above mentioned courses, any course from recognized websites with the consent of the Head of the Department will also be accepted.

5. Award Winners in Sports/Social Activities/ Co curricular/ Extra Curricular Activities at University/ District/ State/ National/ International levels can earn One Extra Credit by producing the Certificate.

Chairman
Board of Studies in Computer Science
Nehru Arts and Science College
Coimbatore.

Course Code	Title		
19U4CAZ604	Skill Based Paper IV: Practical in R Programming		
Semester - VI	Credits - 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective:

To enable the students to gain an in-depth understanding of data structure used in R and learn to import/export data using R.

Course Outcomes (CO):

CO1	Remember various data types, conditional and looping statements
CO2	Understand about R-studio, workspace setup and the various R packages
CO3	Apply data Structures: Vectors, Lists, Matrices and Arrays and Factors and Data Frame in R language and manipulate
CO4	Analyze the feasible logics
CO5	Evaluate the optimal solution of the problem

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 6

S. No.	List of Practical
1	Write a Program to generate Random Number using Standard Deviation
2	Write a Program to find Minimum and Maximum number from given input.
3	Write a Program to check whether the given number is Armstrong Number or not.
4	Write a Program to Convert Decimal number into Binary number using Recursion.
5	Write a Program to find the sum of 'n' natural numbers
6	Write a Program to create a list and to append, modify and delete the elements in the list.
7	Write a Program to create a matrix addition and subtraction.
8	Write a Program to check whether the given number is palindrome or not using function.
9	Write a Program to create the Data Frame and extract the value.
10	Write a Program to Find Sum, Mean and Product of Vector
11	Write a Program to Sample from a Population
12	Write a Program to Sort a Vector
	Total Hours
	90

Tools for Assessment (30 Marks)

Logical Thinking	Program Execution	Test I	Test II	Observation	Attendance	Total
5	5	5	5	7	3	30

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	H	H	H	H	H
CO3	H	H	H	H	H
CO4	H	H	H	H	H
CO5	H	H	H	S	S

S - Strong; H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code		Title	
18U3BAA404	Allied Paper IV: Accounting for Cost and Management		
Semester: IV	Credits: 4	CIA: 25 Marks	ESE:75 Marks

Course Objective:

To enable the students to know the fundamental concepts of Accounting.

Course Outcomes (CO):

CO1	Capable of fixing product price
CO2	Ability to prepare quotations and tenders
CO3	Ability to differentiate Financial, Cost and Management Accounting
CO4	Interpret the Financial Statement

Offered by: Commerce

Course Content

Instructional Hours / Week: 6

Unit	Description	Text Book	Chapter
I	Introduction-Accounting Principles-Banches of Accounting-Accounting rules	1	1
	Journal - Ledger – Subsidiary Books	1	2
	Trial Balance	2	3
Instructional Hours			18
II	Preparation of Final accounts: Trading Account, Profit & Loss Account and Balance Sheet	1	3,4
	Depreciation – Accounting for Methods of providing depreciation – straight line method, Written Down Value method	2	11
Instructional Hours			18
III	Cost Accounts – meaning- elements of cost	4	1
	Preparation of cost sheet (simple problems only)	5	2
Instructional Hours			18
IV	Material cost: stores ledger – FIFO-LIFO- weighted Average, simple Average	5	3
	Management Accounting – meaning- objectives- Management Account with Financial Account, Management Accounting & Cost Accounting	3	1
Instructional Hours			18

V	Budget and Budgetary control – preparation of various budgets- Flexible Budget - Production Budget-Cash Budget-Sales Budget.	3	10
Instructional Hours			18
Total Hours			90

Text Book(s):

1. N.P. Srinivasan and Sakthivel Murugan , “**Accounting for Management**”, Sultan Chand & Sons, 2012.
2. T.S. Reddy and A. Murthy, “**Financial Accounting**” , Margham Publications, 2016.
3. Shashi K. Gupta and R.K. Sharma, ‘**Management Accounting**’, Kalyani Publishers, 2006.
4. S.P. Jain and KL. Narang , “**Cost Accounting**”, Kalyani Publishers, New Delhi.Edn.2014.
5. Dr. A. Murthy & Dr. S. Gurusamy, “**Cost Accounting**” , Vijay Nicole Imprints Private Limited, Chennai. 2014.

Reference Books:

1. T.S Reddy and A. Murthy, “**Financial Accounting**”, Margham Publications, 2015.
2. T.S Reddy and A. Murthy, “ **Management Accounting**”, Kalyani publishers, 2009.
3. T.S.Grewal, “**Double Entry Book Keeping**”, Sultan Chand & Sons., 2004.
4. Reddy & Hari Prasad Reddy, “**Cost Accounting**”, Margham Publications, 2009

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar / Critical Thinking		Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	H	S	H	H	M
CO 2	H	S	H	H	M
CO 3	H	S	H	H	H
CO 4	H	S	S	S	S
CO 5	S	S	S	S	S

S - Strong; H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by

Course Code		Title	
18U3CKC204	Core Paper V - Data Structures		
Semester - II	Credits - 4	CIA:25Marks	ESE:75 Marks

Course Objective:

To enable the students to understand about the various techniques such as Linked list, Searching and Sorting and apply them to solve complex programs.

Course Outcomes(CO):

CO1	Tell about various operations such as searching and sorting
CO2	Understand about the efficient storage mechanism of data
CO3	Choose appropriate data structures for solving the complex problem
CO4	Apply the various algorithms to solve real world problem using any programming language
CO5	Apply data structures to store different type of data

Offered by: Computer Applications

Course Content

Instructional Hours/Week: 4

Unit	Description	Text Book	Chapter
I	Introduction: Overview- How to create Programs - How to Analyze Programs. Arrays: Axiomatization - Sparse Matrices - Representation of Arrays. Stacks & Queues: Fundamentals - Evaluation of Expressions - Multiple Stacks and Queues.	1	1,2,3
Instructional Hours			12
II	Recursion: Recursive definition and process - recursion in C - Writing Recursive program - simulating Recursion - efficiency of recursion. Queues and List: The queue and its sequential representation - Linked list - List in C - An example Simulation using linked list - other list structure.	2	3,4
Instructional Hours			12
III	Trees: Binary Tree - Binary Tree representation - the Huffman algorithm - representing list as Binary - Trees and their applications - Game trees. Graphs: A Flow problem - The linked representation of Graph - Graph traversal and spanning forests	2	5,8
Instructional Hours			12
IV	Internal Sorting: Insertion Sort - Quick Sort - 2-Way Merge Sort - Heap Sort - Shell Sort. External Sorting: Storage Devices - K-Way Merging- Sorting With Tapes: Balanced Merge Sorts - Polyphase Merge.	1	7,8
Instructional Hours			12

V	Symbol Table: Static Tree Tables - Dynamic Tree Tables - Hash Tables: Hashing Functions- Overflow Handling.		
	Files: Files, Queries and Sequential Organizations- Index Techniques - File Organization: Sequential Organization- Random Organization- Linked Organization.	1	9, 10
		Instructional Hours	12
		Total Hours	60

Text Book(s):

1. Ellis Horowitz & Sartaj Sahni, “**Fundamentals of Data Structures**”, Galgotia Publication.
2. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, “**Data Structure using C**”, Pearson Education, 2009.

Unit I : Sections: 1.1 to 1.4, 2.1 to 2.4 and 3.1 to 3.4 (Text Book 1: Chapter 1, 2 and 3)

Unit II : Sections: 3.1 to 3.4, 4.1 to 4.5 (Text Book 2: Chapter 3 and 4)

Unit III : Sections: 5.1 to 5.6 (Text Book 2: Chapter 5)

Unit IV : Section: 7.1 to 7.8, 8.1 to 8.3 (Text Book 1: Chapter 7 and 8)

Unit V : Section: 9.1 to 9.3, 10.1, 10.3 (Text Book 1: Chapter 9 and 10)

Reference Book(s):

1. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, “**Fundamentals of Computer Algorithms**”, Galgotia Publications Pvt Ltd, 1999.
2. Jean-Paul Tremblay and Paul G. Sorenson, “**An Introduction to Data Structures with Applications**”, Second Edition, Tata McGraw Hill, 2008
3. Mark Allen Weiss, “**Data Structures and Algorithm Analysis in C**”, Florida International University, Pearson Education, Second Edition, 1997.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	M	M	H	M	M
CO3	H	H	H	H	M
CO4	H	H	H	M	H
CO5	H	H	H	M	H

S – Strong; H – High; M – Medium; L - Low

Course Designed by	Verified by	Checked by	Approved by

Course Code	Title		
18U3MIA101	Allied Paper I : Mathematics for Computer Science		
Semester: I	Credits : 4	CIA: 25 Marks	ESE: 75 Marks

Course Objective:

To enable the students to learn the concepts of Statistical and Numerical Methods used in Computer applications.

Course Outcomes:

CO1	To understand the concepts of Matrices and its applications.
CO2	To solve Linear Algebraic Equations using various methods.
CO3	To solve problems in Numerical Differentiation and Integration.
CO4	To understand measures of Central Tendency and Dispersion.
CO5	To acquire knowledge about Correlation and Regression concepts.

Offered by: Mathematics with CA

Course Content**Instructional Hours / Week: 5**

Unit	Description	Text Book	Chapter
I	Matrices: Introduction – Types of Matrices –Matrix Operations - Determination – Inverse of a matrix – Rank of a Matrix.	3	4
	Eigen value Problems.	1	4
Instructional Hours			15
II	System Of Simultaneous Linear Algebraic Equations: Gauss elimination, Gauss Jordan, Gauss Seidal methods.	2	4
Instructional Hours			15
III	Numerical Differentiations: Newton's forward Difference - Backward Difference – Stirling formula.	2	9
	Numerical Integration: Trapezoidal Rule & Simpson's rule.	2	9
Instructional Hours			15
IV	Measures of Central Tendency: Mean Median and Mode – Relationship among mean, median and mode.	3	7
	Measures of Dispersion: Range, Quartile deviation and Standard deviation.	3	8
Instructional Hours			15
V	Correlation: Coefficient of correlation – Regression equation of variables.	3	13
	Regression: Types of relationship – Linear regression.	3	13
Instructional Hours			15
Total Hours			75

Text Books:

1. P.Kandasamy, K.Thilgavathy, K.Gunavathy, “ **Engineering Mathematics**”, Volume I, S. Chand Company, 2006.
2. P.Kandasamy, K.Thilagavathy and K.Gunavathy “**Numerical Methods**”, S.Chand& Company Ltd., Revised 2005.
3. P.A.Navanitham, “**Business Mathematics and Statistics**”, (Part II), Jai Publishers, Trichy – 21.
 - Unit I** : Book 3, Chapter 4 , Book 1, Chapter 1 (Eigen value problems only)
 - Unit II** : Book 2, Chapter 4, Section: 4.1- 4.3, 4.9
 - Unit III** : Book 2, Chapter 9, Sections: 9.1 - 9.4, 9.7, 9.9, 9.13, 9.14
 - Unit IV** : Book 3, Chapter 7, (only Mean, Median and Mode)
Book 3, Chapter 8, (only Range, Q.D and S.D)
 - Unit V** : Book 3, Chapter 13.

Reference Books:

1. E. Balagurusamy, “**Numerical Methods**”, Tata McGraw Hill Publishing Company LTD, Reprint, 2008.
2. S. C. Gupta, V. K. Kapoor, “**Fundamental of Mathematical Statistics**” Sultan Chand & Sons, Reprint 2014.

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Problem Solving Skill	Attendance	Total
5	5	6	3	3	3	25

Mapping

CO \ PSO	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	H
CO2	M	M	H	M
CO3	M	L	H	M
CO4	L	M	H	H

Course Designed by	Verified by HOD	Checked by	Approved by