



Estd. 1962
'A++' Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERISTY, KOLHAPUR-416 004. MAHARASHTRA
PHONE : EPABX-2609000 website- www.unishivaji.ac.in
FAX 0091-0231-2691533 & 0091-0231-2692333 – BOS - 2609094
शिवाजी विद्यापीठ, कोल्हापूर – 416004.

दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग- २६०९०९४)
फक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

Ref../SU/BOS/Com & Mgmt./

Date : 02 JUL 2022
No 00032

To,

The Principal
All Affiliated (Commerce & Management) Colleges/Institutions,
Shivaji University, Kolhapur

Subject : Regarding Syllabi of BCA Part-III (Sem-V/VI) Choice Based Credit System (CBCS) degree programme under the Faculty of Commerce & Management.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi of **BCA Part-III (Sem-V/VI) Choice Based Credit System (CBCS)** under the Faculty of Commerce & Management.

This syllabi shall be implemented from the academic year **2022-2023** onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in (Student - Online Syllabus).

The question papers on the pre-revised syllabi of above mentioned course will be set for two examination These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl : As above

Copy to,

1. Dean, Faculty of Commerce & Management
2. Chairman, Board of Studies
3. Director, BOEE
4. Appointment Section
5. P. G. Admission Section
6. B.Com and O. E. 1 Section
7. Affiliation Section (U.G./P.G.)
8. Computer Center/I.T.
9. Eligibility Section
10. Distance Education
11. P.G. Seminer Section

for information

for information and necessary action.

SHIVAJI UNIVERSITY, KOLHAPUR



Established 1962

NAAC A++ Grade

Faculty of Commerce and Management

Syllabus for

B.C.A. Part- III (Sem – V and VI)(CBCS)

(To be implemented from June 2022 onwards)

(Subject to the modifications that will be made from time to time)

B.C.A Part-III (Sem-V)

Course Code : CC 501	Java Programming	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal:30
Course Outcomes:	The student will be able to: <ol style="list-style-type: none"> 1. Understand the features of Java Language 2. Demonstrate Object-Oriented Programming using Java 3. Develop Multithreaded and Networking applications 4. Design GUI applications using AWT and Swing. 		
Unit No.	Description	No. of Periods	
Unit 1	Java Fundamentals Introduction to Java, History and Features of Java, C++ vs Java, Simple Java Program, Internal path setting, JDK, JRE, and JVM (Java Virtual Machine),JVM Memory Management, data types, Unicode System, Operators, Keywords, and Control Statements, methods, constructor, class,objects,methods,Accessmodifiers,statickeyword,finalkeyword,STRINGManipulation,Array,	15	
Unit 2	Inheritance, Polymorphism and Encapsulation Inheritance in Java, Is-A Relationship, Aggregation and Composition(HAS-A),Types of inheritance, this & super keyword Polymorphism in Java, Types of polymorphism, Static and Dynamic Binding, Abstract class and method, Interface, Encapsulation in Java, Getter and setter method in Java.	15	
Unit 3	Package, Multithreading and Exception handling Defining & create packages, system packages, Introduction of Exception, Pre -Defined Exceptions, Try-Catch-Finally, Throws, throw,User Defined Exception examples, Multithreading- introduction, Thread Creations, Thread Life Cycle, Life Cycle Methods, Synchronization, Wait() notify() notify all() methods	15	
Unit 4	AWT,SWING (JFC) Introduction and Components of AWT, Event-Delegation Model, Listeners, Layouts, Individual Components Label, Button, Check Box, Radio Button, Introduction Diff B/W AWT and SWING, Components hierarchy, Panes, Individual Swings components J Label, JButton, JText Field, JTextArea	15	
	Reference Books: <ol style="list-style-type: none"> 1. Java - The Complete Reference-Author – Herbert Schildt, Latest Edition – 11th Edition, Publisher – McGraw Hill Education 2. The Complete Reference-Herbert Schildt 3. Core Java An Integrated Approach (Black Book)- Dr. R. NageswaraRao 		

Course Code: CC502	Data Warehousing and Data Mining	Credits:04	Marks: 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal:30
Course outcome	After completion of this course students will be able to <ol style="list-style-type: none"> 1. Define the Data warehouse architecture and its Implementation. 2. Describe the Architecture of a Data Mining system. 3. Understand the various Data preprocessing Methods. 4. Perform classification and prediction of data 		
Unit No.	Descriptions	No. of Periods	
1	Data Warehousing: Introduction to data warehousing, Data warehousing components, Building a data warehouse, Difference between database system and data warehouse, Data warehouse architecture-3 Tier architecture, Warehouse schema design, Data extraction, Cleanup& transformation tools, Multi-dimensional data model, Data cubes- Stars, Snowflakes, Fact constellations, Concept hierarchy, Online analytical processing-	15	
2	Data Mining: Introduction of data mining - Definition and functionalities Issues in DM, Applications of data mining, KDD process. Data Pre-processing: Data Pre-processing, Data cleaning, Data integration and transformation, Data reduction, Discretization and concept hierarchy generation, Data mining Tasks	15	
3	Data Mining techniques: Frequent item - set and association rule mining: apriori algorithm, use of sampling for frequent item- set tree algorithm, Graph sampling : frequent sub graph mining , tree mining ,sequence mining Classification and Prediction - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification –Prediction – Accuracy and Error Measures .	15	
4	Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods – K-Means and K-Medoids	15	
	References: 1. Kimball, Ralph & et al, The Data Warehouse Lifecycle Toolkit, John Wiley & Sons, 2006. 2. Jiawei Han and MichelineKamber : “Data Mining Concepts and Techniques”, 3rd Edition,Elsevier,2012. 3. Arun K. Pujari, "Data Mining",University Press. 4. PaulrajPonnian, “Data Warehousing Fundamentals”, John Willey.		

Course Code: CC 503	IT Security	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal:30
Course Outcomes	The student will be able to: <ol style="list-style-type: none"> 1. Understand the concept and need of IT security, 2. Identify different security threats to information systems. 3. Describe security controls used for IS security. 4. Understand provisions in IT Act 2000 and Design Security policy for IT Enabled Organization. 		
Unit No.	Description	No. of Periods	
Unit 1	Introduction to IT Security Definition of Information System Security, Basics– Introduction, Need, Significance and Challenges of IT Security, IT Assets - Physical Assets (Servers, Workstations, Peripherals, Smartphones, Networking Devices, Information Technology Equipment, Storage Devices, Supplies, IT Personnel) and Logical Assets(Software, Data and Information)Information security dimensions- confidentiality, integrity and Availability	15	
Unit 2	Security Threats Introduction and types of security threats, sources of threats, Cyber Crimes. Security Attacks- Passive attacks (Network Analysis; eavesdropping; Traffic control), Active attacks (Phishing, Sniffing, spoofing, Denial of service attack), Malicious Code (Virus, Malware, Worm, Trojan horse), Keyboard loggers, Web tracking, Perpetrators (Hackers; Crackers) Other Security Threats- Acts of God (Natural disaster), environmental hazards, Theft, User error, Hardware failure, Software failure.	15	
Unit 3	IT Security Control Measures Identification, Access Controls/Authentication: Password Protection, Biometric verification, Intrusion detection and prevention system, Multilevel authentication. Antivirus, Recovery software and services, Data backups, Malware detectors, Logs. Cryptography-Types of Cryptography, Digital signature and certificate. Firewall System, Deception Technology Control Measures for Internet Security	15	
Unit 4	IT Act and Security Standards <ul style="list-style-type: none"> • IT Act 2000 and features of IT Act, Amendments in IT Act, Cyber-crimes under Information Technology Act 2000, Legal issues and challenges 	15	

	<ul style="list-style-type: none"> • Cyber security standards • IS Audit and Security Policy 	
	<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – by Deven N. Shah, Wiley. 2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 2nd edition 3. Michael T. Simpson, Kent Backman, James Corley —Hands- On Ethical Hacking and Network Defense, 2016 4. Steven DeFino, Barry Kaufman, Nick Valenteen —Official Certified Ethical Hacker Review Guide, 2015 5. William Stallings, —Principle of Computer Security, McGraw Hill Education, Fourth Edition, 2016. 6. AtulKahate, —Cryptography and Network Security, Tata McGraw-Hill, 2003 7. Essential Computer Security: Everyone’s Guide to Email, Internet and Wireless security”, by Tony Bradley, Syngress Publication 2006 8. “Cryptography & Network Security”, by Behrouz A. Ferouzan, Tata McGraw Hill, 2007. 9. Information & Network Security for GTU, I. A. Dhotre V. S. Bagad, Technical Publication, Edition 2018 10. Cyber frauds, cyber crimes and law in India by Pavanduggal. 11. Cyberlaw: The Law of the Internet and Information Technology, Brian Craig. 12. Information System Audit and Control by Ron Weber 	

DSE 504 Elective-I	1. Python Programming	Credits: 4	Marks:100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes	Students of this course will be able to : 1. Acquire programming skills in core Python. 2. Develop Python programs with conditionals and loops. 3. Understand advance datatypes in Python Programming. 4. Develop problem solving skills and their implementation through Python.		
Unit No.	Description	No. of Periods	
Unit 1	INTRODUCTION TO PYTHON Installation, Spyder IDE, Python Interpreter, History Of Python, Python Features, Applications Of Python, Data Types, Types Of Operators, Operators Precedence, Expressions, Statements, Functions, Comment,Strings - Accessing Values In Strings, Updating Strings, Escape Characters, Built-In String Methods, User Input	15	
Unit 2	CONTROL FLOW AND LOOPS Conditionals: Boolean Values And Operators, Conditional (If), Alternative (If-Else) ,Chained Conditional (If-Elif-Else) Looping-While Loop, The Infinite Loop, For Loop, Iterating BySequence Index, Using Else Statement With Loops, Nested Loops,Break, Continue & Pass Statement. Functions: Function With Arguments, Lambda Functions	15	
Unit 3	LISTS, TUPLES, DICTIONARIES AND SET Lists-Create a List, Get and Set Items ,Add and Remove Items, List Slices, Different List Methods TUPLES - Creation and Accessing Values, Updating Tuples, DeletingTuple Elements, Basic Tuples Operations, Indexing, Slicing DICTIONARY- Accessing Values in Dictionary, Updating Dictionary,Delete Dictionary Elements, Properties of Dictionary Keys, Built-InDictionary Functions and Methods. SETS -Concept of Sets, Creating, Initializing and Accessing the Elements, Sets Operation.	15	
Unit 4	MODULES, FILES I/O,GUI The Import Statement, Modules (Datetime, Calendar, Math Module) Files I/O: Text Files, Reading And Writing Files Introduction To GUI In Python	15	
	Reference Books: 1. R. NageswaraRao, “Core Python Programming”, Dreamtech 2. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf. 3. Programming with python, A users Book, Michael		

DSE 504 Elective-I	2. Emerging Trends in Database and Web Technology	Credits: 4	Marks:100
Marks:100	Total Hours of Teaching: 60	External:70	Internal : 30
Course Outcomes	By the end of this course, the students should be able to: <ol style="list-style-type: none"> 1. Use XML and AJAX for asynchronous data transfer. 2. Describe the role of JQuery in Web application. 3. Differentiate between SQL and NoSQL database system. 4. Analyze given data using MongoDB. 		
Unit No.	Description	No. of Periods	
Unit 1	Introduction to XML and AJAX Introduction to XML, Working with Basics of XML: XML Tree, XML Syntax, XML Elements, XML Attributes, XML Namespaces, XML Display, XML Application, Overview of AJAX, AJAX components, Asynchronous Data Transfer with XML Http Request.	15	
Unit 2	Introduction to jQuery jQuery Introduction, jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery and HTML contents, jQuery and CSS Classes, Working with jQuery and AJAX.	15	
Unit 3	Introduction to NoSQL Introduction to NoSQL database, Types of NoSQL database, NoSQL data modeling, Benefits of NoSQL database, Comparison between SQL and NoSQL database system, NoSQL using MaongoDB.	15	
Unit 4	Working with MongoDB Introduction to MongoDB shell, Basic data types, Running the MongoDB shell, MongoDB Client, ,Basic operations with MongoDB shell, Arrays, querying with MongoDB, find function, OR queries, Types specific querying, Aggregation in MongoDB.	15	
	Reference Books <ol style="list-style-type: none"> 1. Teach yourself XML in 21 days, Steven Holzner, Sams. 2. Foundations of AJAX, Ryan Asleson and Natahniel T. Schutta, Apress 3. Learning from jQuery: Building on Core Skills, 2013, CallumMacrae, O'Reilly 4. Professional NoSQL, Shashank Tiwari, 2011, Wiley 5. Teach yourself NoSQL with MongoDB in 24 Hours, Brad Dayley, Sams 		

Course Code: DSE 504	3. Ethical Hacking	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External:70	Internal : 30
Course Outcomes	After completion of the course, students should be able to: 1. Understand the risks in the computer systems and networks. 2. Identify and analyze problems in computer and networks security. 3. Identify security vulnerabilities and weaknesses 4. Develop security mechanisms to protect computer systems and networks.		
Unit No.	Description	No. of Periods	
Unit 1	Ethical Hacking Introduction to Ethical Hacking, Objective of Ethical Hacking Need of Ethical hacking, Significance of ethical hacking for effective security management, Types of Hackers, Black Hat vs. Grey Hat vs. White Hat (Ethical) hacking	15	
Unit 2	Reconnaissance, Scanning and Enumeration Attacks and Vulnerabilities, Asset, Access Control, CIA, Authentication, Authorization, Risk, Attack Surface, Security-Functionality-Ease of Use Triangle Introduction to Reconnaissance: Active and Passive Reconnaissance Introduction to Scanning and Enumeration: Scanning IP Address, Network and It's Services, Enumerating Open Ports - HTTP/S, SMB, SNMP, SMTP, Finding Vulnerabilities and It's Proof-of-Concept (POC)	15	
Unit 3	Types of vulnerabilities: OWASP Top 10 : cross-site scripting (XSS), cross site request forgery (CSRF/XSRF), SQL injection, input parameter, manipulation, broken authentication, sensitive information disclosure, XML, External Entities, Broken access control, Security Misconfiguration, using components with known vulnerabilities, Insufficient Logging and monitoring, OWASP Mobile Top 10, CVE Database, ARP Poisoning, DoS attack, SQL injection attack.	15	
Unit 4	Vulnerability Assessment and Penetration Testing (VAPT) Process: Introduction to VA and PT, Threat modelling, Categories of Penetration Test, Tools used like WebInspect / Qualys, Nessus, differences in VA and PT.	15	
	Reference Books: 1. Hacking: The Art of Exploitation by Jon Erickson 2. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Egebretonson 3. Certified Ethical Hacker Study Guide v9, Sean-Philip Oriyano, Sybex; Study Guide Edition,2016 4. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2007		
Course Code:	1. Digital Marketing	Credit: 04	Marks:100

GE 505 (Elective-II)			
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes (Cos):	At the end of the course the student should be able to: 1. Learn the applications of Digital Marketing 2. Analyze the different digital marketing avenues. 3. Examine digital marketing tools. 4. Build real life problems in the domain of digital marketing		
Unit No.	Description	No. of Periods	
I	Digital Marketing: Introduction, Definition, Meaning and Scope, Advantages of digital Medium over other media, Digital Marketing Plan. Digital Marketing Strategy-POEM framework, .Digital consumer behaviour.	15	
II	Search Marketing : Introduction, Meaning, Types ,Basics of Search marketing, SEO-Working, Search Engine marketing (SEM) :Introduction, Meaning, Types of SEM, Difference between SEO and SEM, Overview of Google Ad words, Keywords research and analysis, Tracking the success of SEM Search Engine	15	
III	Types of Digital Marketing 1.Mobile Marketing: Different kinds of mobile marketing ,mobile marketing ecosystem 2. Social Media Marketing: Different social Media Channels, Social media for various businesses B2C& B2B,Measuring social media ROI 3. Content Marketing: story telling in Social media 4. E-Mail Marketing: The basics of Email marketing 5. Display Marketing: Different Kinds of Display marketing , The display Marketing ecosystem	15	
IV	Affiliate Marketing: Introduction, Meaning, Types of Affiliate Mktg., Future of Digital Marketing, Technological advancements in Digital Marketing, Practical Applications of Digital Marketing.	15	
Books Recommended:			
<ol style="list-style-type: none"> 1. Gupta Seema.-Digital Marketing,McGraw Hill Education(India) Pvt.Ltd. 2. Ahuja Vandana-Digital Marketing,Oxford University Press, 2015. 3. Mohammed R.,—InternetMarketing,McGrawHill,NewYork,Vol.4,2001 4. Krishnamurthy,S.&Singh,N.(2005),TheInternationalE-MarketingFramework(IEMF) 			
Suggested Research Journal: Vikalp – IIMAhmedabad			
<ul style="list-style-type: none"> • Boudreau,M.-C.&Watson,R.T.(2006),InternetAdvertisingStrategyAlignmentInternet Research,16,23-37. • ImportantDigitalMarketingChannelsYouShouldKnowAbout".DigitalDoughnut.Retrieved17 October2015. 			

Course code: GE505(Elective II)	2. Management Information System	Credit:04	Marks:100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes	After completion of this course students will be able to- 1.Understand the fundamental principles of information systems 2. Describe the types of management and decision making 3. Demonstrate different types of IS used in business. 4. Explain various applications of MIS		
UNIT No.	Description	No.ofPeriods	
I	Introduction to Information System <ul style="list-style-type: none"> • Introduction to systems- definition, need, types, characteristic Definition of Information • Classification of Information • Need and importance of information system • Definition and Characteristics of information system • Role of information system in business 	15	
II	Decision Making <ul style="list-style-type: none"> • Decision Making Concepts, and Process, Types of Decisions • Behavioral Concepts in Decision Making • Organizational Decision-Making • MIS and Decision Making 	15	
III	Types of Information System <ul style="list-style-type: none"> • Introduction • Operational and Knowledge Level- TPS (Transaction Processing System), OAS (Office Automation System), KWS (Knowledge Work System) • Management and Strategic Level- • MIS (Management Information System-need characteristics, • DSS (Decision Support System)-need, characteristics, components, • ESS (Executive Support System)-need, characteristics 	15	
IV	Applications of MIS <ul style="list-style-type: none"> • Financial Information System • Human Resource Information System • Production Information System • Marketing Information System 	15	

ReferenceBooks:

- 1.W. S. Jawadekar,Management Information Systems, 4th edition, McGraw Hill.
2. Ramesh Behl , James O' Obrien and George M. Marakas, Management Information Systems, 10th edition, McGraw Hill edition.
3. DR. Milind M. Oka. , Management Information Systems , Everest Publishing House

Course Code: GE 505 Elective-II	3. Knowledge Management	Credits: 04	Marks : 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes	After completion of this course students will be able to - 1. Explain the fundamentals of knowledge management 2. Understand of the Knowledge Management life cycle. 3. Categorize the Knowledge Management tools. 4. Implement Knowledge Management in different sectors.		
Unit No.	Description	No. of Periods	
I	Introduction to Knowledge Management (KM): <ul style="list-style-type: none"> ● History of Knowledge Management, ● Definition, scope and significance of Knowledge Management ● BasicTypes of Knowledge, ● Knowledge Management Processes ● Knowledge Management Systems ● Data-Information-knowledge-Wisdom relationship ● Organizational impact on knowledge management ● Factors influencing Knowledge Management. 	15	
II	Knowledge Management Life Cycle <ul style="list-style-type: none"> ● Introduction & phases of Knowledge management life cycle ● Principles of Knowledge Management ● Techniques of Knowledge Management ● Knowledge Application Systems ● Knowledge Capture Systems ● Knowledge sharing systems ● Knowledge Discovery Systems 	15	
III	Knowledge Management Techniques and Tools <ul style="list-style-type: none"> ● Organizational knowledge creation- Knowledge network, knowledge mapping tools- visual thinking software, concept map, ● Knowledge Acquisition tools- e-mail, newsgroup, web-conferencing, IRC etc. ● Organizational knowledge processing ● Knowledge analysis- data mining, on-line data analytical processing 	15	
IV	Knowledge Management and Industry perspective: <ul style="list-style-type: none"> ● Role of Information Technology in Knowledge Management Systems ● Knowledge Management and E-commerce ● Bench marking and Knowledge Management ● Knowledge Management in Manufacturing and service industry, ● KM roles and Responsibilities within organizations, ● Future of Knowledge Management. ● Future challenges for KM. ● Careers in Knowledge Management 	15	

References:

- Knowledge Management, Sudhir Warier, Vikas Publishing House.
- Web Warehousing & Knowledge Management, Mattison: Tata McGraw-Hill.
- Knowledge management: An Evolutionary view, Becerra Fernandez: PHI.
- Knowledge Management, Fernando: Pearson.
- Knowledge Management, B. Rathan Reddy: Himalaya.
- Knowledge Management, Tapan K Panda: Excel.
- Knowledge Management systems, Barnes: Cengage.
- The Knowledge Management tool kit, Tiwana: 2/e, Pearson Education.
- Knowledge Management, Sislop: Oxford University Press,.
- Knowledge Management, Debowski: Wiley Student Edition, Wiley Ind
- Knowledge management, A Thothathri Raman, Excel books

CCL 506	Lab Course IX based on CC501	Credit:-2	Marks 50
Marks:50	Total Hours of Teaching:30	External : 50	
Course Outcomes:	1. Implement the Concept of OOP in Java through simple programs. 2. Implementation and Evaluation of concept related to class and inheritance, concept of Multiprogramming and Exception Handling.		
	List of Programs (Note: Students should certify & enclose minimum 10 programs in journal.)		
1	Java programs based on branching and looping statements.		
2	Java programs based Type Casting		
3	Java programs based on command line arguments		
4	Java programs based on constructors		
5	Java programs based on inheritance		
6	Java programs based on method overloading		
7	Java programs based on method overriding		
8	Java programs based on interfaces		
9	Java programs based on packages		
10	Java programs based on multithreading		
11	Java programs based on exception handling		

CCL 507	Lab Course-X Based on DSE504	Python Programming	Credit:-2
Marks:50	Total Hours of Teaching:30	External : 50	
Course Outcomes	After completion of this course student should be able to- 1. Demonstrate and use different Datatypes in Python. 2. Apply various built looping statements and Modules provided by Python.		
1.	Program to display name and address.		
2.	Program to Accept two number and display addition, subtraction, multiplication, division and modules.		
3.	Program to calculate factorial of given number.		
4.	Program to create a list of 100 numbers and separate those numbers in two different list one includes odd number other even.		
5.	Program to display maximum number and minimum number from given list		
6.	Program to demonstrate slicing.		
7.	Program to demonstrate set operators(union ,intersection, minus)		
8.	Program to print current date and time.		

9.	Program to Today's Year, Month, and Date
10.	Program to convert Date to String
11.	Program to display the Calendar of a given month.
12.	Program to display calendar of the given year.
13.	Program to demonstrate File input.
14.	Program to demonstrate file output
15.	Program two add two numbers using GUI.

Note: Students should certify & enclose minimum 10 programs in journal.

CCL 507	Lab Course-X Based on DSE504	Emerging Trends in Database and Web Technology	Credit:-2
Marks:50	Total Hours of Teaching:30	External : 50	
Course Outcomes:	After completion of this course student should be able to- 1. Demonstrate and use different types of XML files. 2. Apply various built in statements and queries to demonstrate AJAX and MongoDB		
	Practical List		
1	Program to view simple XML file.		
2	Program to prepare Food Menu using XML.		
3	Display Food Menu formatted with CSS file.		
4	Create a simple XMLHttpRequest and retrieve data from txt file.		
5	Create a simple XMLHttpRequest with callback function and retrieve text file data.		
6	Create a simple XMLHttpRequest and retrieve data from xml file.		
7	Write a JQuery program to demonstrate different selectors.		
8	Write a JQuery program to demonstrate different events.		
9	Write a JQuery program to set and get HTML contents and attributes.		
10	Write a JQuery program to set and return CSS properties.		
11	Write a JQuery program to demonstrate AJAX load() method.		
12	Write a JQuery program to demonstrate AJAX get() and post() method.		
13	Create and Drop database using MongoDB.		
14	Create and Drop collection using MongoDB.		
15	Insert document into a MongoDB collection.		
16	Implementing find function to query document in MongoDB collection		
17	Update document into a MongoDB collection.		
18	Delete document from a MongoDB collection.		
19	Sort documents in a MongoDB collection.		
20	Demonstrate Aggregation operations using a MongoDB.		

Note: Students should certify & enclose minimum 10 programs in journal.

CCL 507	Lab Course-X Based on DSE504	Ethical Hacking	Credit:-2
Marks:50	Total Hours of Teaching:30	External : 50	
Course Outcomes	After completion of this course student should be able to- 1. Implement the different methods in ethical hacking. 2. Understand security risks and it's impact using different tools		
1.	Use Google and Whois for Reconnaissance		
2.	Perform Google Dorking		
3.	Use CrypTool to encrypt and decrypt passwords using RC4 algorithm		
4.	Use Cain and Abel for cracking Windows account password using Dictionary attack and to decode wireless network passwords		
5.	Perform vulnerability analysis using Nessus tool		
6.	Run and analyze the output of following commands in Linux - ifconfig, ping, netstat, traceroute		
7.	Perform ARP Poisoning in Windows		
8.	Use NMap scanner to perform port scanning of various forms - ACK, SYN, FIN, NULL, XMAS		
9.	Use Wireshark (Sniffer) to capture network traffic and analyse		
10.	Use Nemesy to launch DoS attack		
11.	Simulate persistent cross-site scripting attack		
12.	Session impersonation using Firefox and Tamper Data add-on		
13.	Perform SQL injection attack		

Note : Student Should certify and enclose at least 10 programs in journal.

BCA-III (Sem-VI)

Course Code: CC 601	Cloud Computing	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External:70	Internal : 30
Course Outcomes (COs) : On completion of the course, the students will be able to:			
CO1	Understand the fundamental principles of Cloud Computing.		
CO2	Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.		
CO3	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.		
CO4	Describe cloud computing applications		
Unit No.	Description	No. of Periods	
Unit I	Introduction to Cloud Computing <ul style="list-style-type: none"> • Introduction • Roots of Cloud Computing • Layers and Types of Cloud • Desired Features of a Cloud • Platform as a Service Providers • Architecture of cloud computing • Challenges in the cloud • Types of Cloud : Private, Public, Hybrid 	15	
Unit II	Virtualization <ul style="list-style-type: none"> • Introducing virtualization and its benefits • Implementation Levels of Virtualization • Virtualization at the OS Model • Virtualization Structure: Hosted Structure, Bare-Metal Structure • Virtualization of CPU,Memory, and I/O Devices • Virtualization in Multicore Processors • Virtual Clusters and Resource management 	15	
Unit III	Cloud Computing Services <ul style="list-style-type: none"> • Infrastructure as a Service • Platform as a servive • Leveraging PaaS for productivity • Guidelines for selecting PaasPovider • Concern with PaaS • Language and PaaS • Software as a Servive • Database as a Service • Specialized Cloud Services 	15	
Unit IV	Cloud Computing Applications <ul style="list-style-type: none"> • Business Applications: MailChimp, Salesforce, Chatter,Paypal 	15	

	<ul style="list-style-type: none"> • Education Applications:Google Apps for Education,Chromebooks for Education,Tablets with Google Play for Education • Entertainment Applications:Online games, Video Conferencing Apps, • Social Applications:Facebook, Twitter, LinkedIn 	
<p>Books Recommended :</p> <ul style="list-style-type: none"> ➤ Cloud Computing : Princi,ples and Paradigms RajkumarBuyya, James Broberg, AndrzejGoscinski, Willey Publication ➤ Cloud Comuting : Black Book KailashJayaswal, JagannathKallakurchi, Donald J. Houde, Dr. Deven Shah ➤ Cloud Computing : Bible Barrie Sosinsky, Willey Publication ➤ Cloud Computing : A Hands-On Approach ArshdeepBahga, Vijay Madiseti 		

Course Code: Elective I DSE 602	1. Internet of Things	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30

Course outcomes

CO1 Understand the fundamentals of Internet of things.

CO2 Identify different components in IoT environment

CO3 Demonstrate Hardware and Software configuration for IoT using Arduino

CO4 Differentiate between different types of IoT applications using Arduino

Unit No.	Description	No. of Periods
Unit I:	Fundamentals of IoT Overview of basic electronics and basic components used in electronics lab: Resistors, Capacitors, Diodes, Transistors, Overview of digital electronics: Logic Gates and Families, Arithmetic circuits, Decoders, Multiplexers, flip flops, Shift Register, Integrated Circuits, Overview of Microprocessor and Microcontroller, Common features of Microcontroller.	15
Unit II:	IoT Environment Introduction to embedded system: History, Classifications and applications of embedded systems, Design principals of IoT architecture, Outline of IoT architecture, Various platforms of IoT, Key features of IoT, IoT Hardware, IoT Software, IoT protocols, Real time examples of IoT, Advantages of IoT, Challenges of IoT.	15
Unit III:	Introduction to Arduino Arduino Uno architecture, Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, Arduino IDE Interfacing basic hardware components with Arduino, Software and Libraries.	15
Unit IV:	IoT Application Development Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Arduino i/o Functions: Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, digitalWrite() Function, analogRead() function, analogWrite() function, Arduino time Functions: delay() function, delayMicroseconds() function, millis() function, micros() function, Working with Serial Monitor.	15

Reference Books:

1. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things Key applications and Protocols”, Wiley, 2012.
2. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014
3. Cuno Pfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1-4493-9357-1
4. Arduino, The complete guide to Arduino for beginners, including projects, tips, tricks, and

programming!, James Arthur, 2020

5. Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects Michael Margolis, Brian Jepson, Nicholas Robert Weldin, O'Really, 3rd Edition, 2020

Course Code: Elective I DSE 602	2.Android Programming	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes			
CO1: Understand the building blocks of Mobile Operating Systems			
CO2: Analyze different elements of Android Development Environment			
CO3: Illustrate the structure of Mobile Applications using Android			
CO4: Identify different components used in Mobile Applications using Android			
Unit No.	Description	No. of Periods	
Unit I	Introduction to Mobile Operating System Mobile operating system, Operating system structure, Constraints and Restrictions, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features. Brief history of Android, Different types of mobile applications	15	
Unit II:	Android Development Environment Introduction to Mobile development IDE's, Setting up development environment, Android Software Development, Working with the AndroidManifest.xml, Dalvik Virtual Machine & .apk file extension, Android Architecture, Building a sample Android application using Android Studio. Android Project Structure, Working with emulator.	15	
Unit III:	Android Application Framework Layouts & Drawable Resources, Basic Building blocks - Activities and Activity lifecycle, UI Components - Views & Notifications, Components for communication -Intents & type of Intents, Android API levels (versions & version names), Developing sample Application	15	
Unit IV:	Basic UI design Form widgets, Text Fields, Layouts, Option menu, Context menu, Sub menu, Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup, Introduction to SQLite Programming, SQLite Database.	15	
Reference Books:			
1. AnubhavPradhan, Anil V Deshpande, " Mobile Apps Development" Edition:I			
2. Teach Yourself Android Application Development In 24 Hours, Edition:I, Publication: SAMS			
3. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.			

4. Barry Burd, “Android Application Development All in one for Dummies”, Edition:I

Course Code: Elective I DSE 602	<u>3. R Programming</u>	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes:	<p>At the end of this course, student will be able to:</p> <ol style="list-style-type: none"> 1. Understand the fundamental syntax of R through practice exercises. 2. Describe the control statements and functions in R. 3. Analyze a data set in R and represent findings using the appropriate R packages. 4. Use data visualization tools. 		
Unit No.	Description	No. of Periods	
1	Introduction to R: Installation of R &RStudio, Features of R, Variables, Constants, Operators in R, Datatypes and R Objects, Accepting Input, Important Built-in functions, Creating Vectors, Accessing elements of a Vector, Operations on Vectors, Vector Arithmetic.	15	
2	Control statements and functions: Control statements: if...else, if else() function, switch() function, repeat loop, while loop, for loop, break statement, next statement, Formal and Actual arguments, Named arguments, Global and local variables, Argument and lazy evaluation of functions, Recursive functions. Creating strings, paste(), Formatting numbers and string using format(), String manipulation	15	
3	Matrices, Arrays and Data frames: Creating matrices, Accessing elements of a Matrix, Operations on Matrices, Matrix transpose, Creating arrays, Accessing array elements, Calculations across array elements, Introduction to data frames and basic operations on data frames.	15	
4	Introduction to Data Visualization: Data visualization basics, Installing and loading packages, importing data, Working with missing data, Extracting a subset of a data frame, Scatter Plot, Box Plot, Bar plot, Plotting categorical data, Stacked bar plot, Histogram, plot() function and line plot, pie chart / 3D pie chart.	15	
	<p>Reference Books:</p> <ol style="list-style-type: none"> 1. R Programming for Data Science Peng, R.D. (2020) Bookdown: New York. 2. An Introduction to Statistical Learning by Gareth James (2017) Publisher: Springer 3. R for Data Science by Garrett Golemund and Hadley Wickham, Publisher: O'Reilly Media, Inc. 2017. 4. R Fundamentals by Sosulski, K. (2018) Bookdown: New York. 5. Discovering Statistics Using R by Andy P. Field, SAGE Publications Limited. 		

Course Code: Elective-II GE 603		1. IT Management	Credit:-4	Marks 100
Marks:100		Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes:	After completion of course student will be able to: 1) Understand IT assets and describe functions of IT Department 2) Identify IT infrastructure components. 3) Describe network infrastructure components and security management activities. 4) Demonstrate best practices and operational processes in Data Centre Management.			
Unit No.	Description	No. of Periods		
1	Information Technology Assets and IT Department Organization Introduction to IT, Components of IT, IT Assets, Types of IT Assets, Need and Significance of IT Asset Management. Organization of IT Department – set up , roles & responsibilities , Interfacing with other functional departments , Functions of IT Management Department. IT Professionals- Recruitment, Background checking, segregation of duties, compulsory vacation etc	15		
2	IT Infrastructure Management Introduction to IT Infrastructure, Infrastructure Components (Hardware, Software, Network), Need and significance of Infrastructure Management, Hardware infrastructure management: Selecting, installing, deploying, maintaining, and configuring all the hardware in the infrastructure. Software Infrastructure Management: Selecting, installing, deploying, maintaining, and configuring all the software's in the infrastructure. Software Licensing issues, Licensing options	15		
3	Network Infrastructure and Security Management: Network infrastructure Components, Selecting, installing, deploying, maintaining, and configuring all the network components in the infrastructure Need and significance of Security Management, IS security planning, Security program, Risk management and control , Formation of SOC, Organization of Responsibilities of SOC.	15		
4	Data Centre Management: Introduction to Data Centre, Need and significance to Data centre, Types of Data Centre (Tier I, Tier II, Tier III, Tier IV), Regulations, best practices and operational processes, Introduction to virtualization.	15		
	Reference Books: 1. Information Technology for Management : henry C. Lucas Jr. Tata McHill 2. Information Technology Planning – Lori A.Goetsch - Jaiko Books 3. Planning & Financial Management of IT–Frank Bakhister–British Library catalogue in Publish of Data 4. Information Technology for Management – John Wiley & SMS (ASIA) PAC Lts. Singapore			

	5. Management of Technology – Zafar Husain Sushil ,RD Patnaik , ANMOL Publication Pvt.Ltd., New Delhi -110002 6. Data Centre Handbook by Hwaiyu Geng PE 7.Data Centre Management: Your Guide to Efficient Data Centre Operation	
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Course Code: Elective-II GE 603	2. ERP	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
CourseOutcomes	After completion of this course student should be able to- 1. Understand concept, need and significance of ERP. 2. Demonstrate different ERP models with their subsystem 3. Evaluate features of ERP products, select ERP application and plan ERP project. 4. Describe organizational opportunities and challenges in the design system within a business scenario.		
UNITNo.	Description	No.ofPeriods	
1	Business Process Reengineering: Meaning and definition of BPR, Need of BPR , Business process, BPR Phases	15	
2	Introduction to ERP: Introduction ,concept and definition of ERP, direct and indirect benefits of ERP, ERP Evolution, Conceptual Model of ERP, ERP models and subsystems	15	
3	ERP Implementation: ERP implementation life cycle, ERP implementation phases Selection criteria of ERP, role of consultant in ERP implementation, ERP implementation strategies, costs in ERP implementation, Critical success and failure factors of ERP implementation.	15	
4	ERP Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. Introduction to SAP and Oracle ERP packages with their key features and subsystems.	15	
	ReferenceBooks: 1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill 2. Rahul V. Altekar “Enterprise Resource Planning”, Tata McGraw Hill, 3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – A Concepts and Practice”, PHI 4. Mary Summer, “Enterprise Resource Planning”- Pearson Education		

Course Code: Elective-II GE 603	3. M - Commerce	Credit:-4	Marks 100
Marks:100	Total Hours of Teaching: 60	External :70	Internal : 30
Course Outcomes	After completion of this course students will be able to - 1) Understand the concepts and scope of E- Commerce. 2) Differentiate between m commerce and E-Commerce. 3) Describe M commerce applications in industry. 4) Explain security issues and control measures in M-commerce.		
Unit No.	Descriptions	No. of Periods	
1	E-Commerce Introduction, meaning and definition of E-Commerce, Brief history of E-Commerce, Need of Ecommerce, Advantages and limitations of e-commerce, Role of ecommerce in industries, Requirements of E-Commerce, Scope of E – Commerce, , E-commerce Models(B2B,B2C,C2B,C2C,B2G,G2B)	15	
2	Mobile Commerce Introduction, scope of mobile—commerce, applications of m-commerce, . Principles of mobile commerce, benefits of mobile commerce, limitations of mobile commerce, E-commerce vs. M-commerce	15	
3	Mobile Commerce: Theory and Applications The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E–commerce in The Automotive Industry – Location– Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M–commerce Business Models	15	
4	Mobile Commerce Security Introduction to Web security, Security threats in M-commerce, Control measures in mobile commerce. (Firewalls & Transaction Security. Multilevel authentications) Security Challenges in M –Commerce.	15	

REFERENCES

1. P. J. Louis, "M-Commerce Crash Course", McGraw- Hill Companies February 2001.
2. Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies Of Wireless Business" Cambridge University Press March 2001.
3. Gary Schneider, Electronic Commerce, Thomson Publishing. ISBN-10: 1-4239-0305-6
4. Pandey, Srivastava and Shukla, E-Commerce and its Application, S. Chand
5. P.T. Joseph, Electronic Commerce – An Indian Perspective, P.H.I Bharat Bhaskar, Electronic Commerce, TMH

Course Code: AEC 604	Soft Skills & Personality Development	Credit:-2	Marks 50
Marks:100	Total Hours of Teaching: 30	External:	Internal : 50
Course Outcomes	After completion of this course students will be able to - <ol style="list-style-type: none"> 1. Reflect on the importance of Professional behavior. 2. Articulate and adapt the various facets that make up one's personality. 		
UNIT No.	Description	No. of Periods	
1	Soft Skills: Introduction and Importance; Difference between Hard skills and Soft Skills; Need of Soft Skills at the Workplace; Soft Skills for Professional Excellence: Communicative Skills, Critical Thinking and Problem Solving Skills, Team Work, Attitude- steps to build a Positive Attitude, Leadership skill, Time Management- Pareto's Principle; Stress Management	15	
2	Personality Development: Introduction and Importance; Discovering Oneself, SWOT Analysis; Developing Interpersonal Relationships- ways to build Strong Inter Relationships; Etiquette and Manners- Professional Etiquette, Email Etiquette and Telephonic Etiquette ,Dressing, Grooming and Body Language; Group Discussion- Expectations of the Panel, Do's & Don'ts in a Group Discussion; Differences between Group Discussion and a Debate ; Resume Building; Facing The Personal Interview	15	
Reference Books: <ol style="list-style-type: none"> 1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGraw-Hill 1988. 2. Heller, Robert. Effective leadership. Essential Manager series. Dk Publishing, 2002 3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003 4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001 5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004). 6 Dr.K.K. Ramachandran and Dr.K.K. Karthick, From Campus to Corporate, Macmillan Publishers India Limited, New Delhi,2010. 7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004 8. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi. 9. Personality Development and Career management: By R.M.Onkar (S Chand Publications) 			

<p>10. Managing Soft Skills For Personality Development---B.N. Ghosh---- McGraw Hill Education</p> <p>11. Personality Development, Interpersonal Skills and Career Management---Dr. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan ---- Himalaya Publishing House Pvt.Ltd.</p> <p>12. Personality Development –R.C. Bhatia--- Ane Books Pvt.Ltd.</p> <p>13. Soft Skills: An Integrated Approach to Maximise Personality ---Gajendra Singh Chauhan---Wiley Publisher.</p> <p>Nature of Internal Evaluation</p> <p>Mock Interview 10 Marks</p> <p>Role Play 10 Marks</p> <p>Group Discussion 10 Marks</p> <p>Written Assignment 10 Marks</p> <p>Listening Activity 10 Marks</p>
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Course Code: AEC 605	Industrial Visit	Credit: 01	Marks:25
Marks:25	Total Industrial Visits :2	External:	Internal : 25
Course Outcomes:	<p>At the end of the course the student should be able to:</p> <ol style="list-style-type: none"> 1. Linking existing knowledge with learning experience 2. Examining the gap between classroom theoretical training and practical learning in a real-life environment. 		
	Industrial Visit Report		
	<p>Industrial visit report may include following-</p> <ul style="list-style-type: none"> ➤ Company Profile ➤ Objectives of visit ➤ Observations ➤ Details of Journey ➤ Photographs at company location ➤ Visit outcomes 		

CCL 606	Lab Course XI based on DSE602	Internet of Things	Credit:- 4
Marks:100	Total Hours of Teaching:60	External : 100	
Course outcomes			
CO1: Demonstrate the circuit configuration for IoT applications using Arduino boards.			
CO2: Apply the different functions provided in Arduino libraries for execution of IoT applications			
<ol style="list-style-type: none"> 1. Program to Turn an LED on and off every second. 2. Program to read a switch, print the state out to the Arduino Serial Monitor. 3. Program to demonstrate the use of analog output to fade an LED. 4. Program to Read an analog input and prints the voltage to the Serial Monitor. 5. Program to Blink an LED without using the delay() function. 6. Program for a pushbutton to control an LED. 7. Program for the use of INPUT_PULLUP with pinMode() 8. Program to Count the number of button pushes. 9. Program using Analog Input to Read an analog input pin to dim or brighten an LED. 10. Program using Analog Input to control the blinking of an LED with photoresistor. 			
Reference			
<ul style="list-style-type: none"> • https://docs.arduino.cc/built-in-examples/ 			

Note: Students should certify & enclose minimum 10 programs in journal.

CCL 606	Lab Course XI based on DSE602	Android Programming	Credit:- 4
Marks:100	Total Hours of Teaching:60	External : 100	
Course outcomes			
CO1: Design Mobile Applications using different UI components in Android.			
CO2: Apply Android Application Framework to develop mobile applications			
<ol style="list-style-type: none"> 1. Create android application to display Hello World message. 2. Create android application to demonstrate Activity Life Cycle. 3. Create android project to design one activity using different controls. <ul style="list-style-type: none"> • Text View • Edit Text • Button • Image View 4. Create Android Application to demonstrate following layouts: <ul style="list-style-type: none"> • Linear Layout • Relative Layout • Relative Layout • Table Layout 5. Display toast message after click button. 6. Create simple arithmetic calculator in android. 7. Enter your name on one activity and display it on another activity. 8. Create Android application to demonstrate Alert dialog. 9. Create Android application to demonstrate popups. 10. Create one activity in your android application to implement all CRUD operations on SQLite database. (Take any database example) 			
Reference			
https://www.tutorialspoint.com/android/index.htm			

Note: Students should certify & enclose minimum 10 programs in journal.

CCL 606	Lab Course XI based on DSE602	R Programming	Credit:- 4
Marks:100	Total Hours of Teaching:60	External : 100	
<p>Course outcomes</p> <p>CO1: Apply syntax of R through practice exercises. CO2: Implement the control statements, functions, data visualization. in R.</p>			
<p>Practical's:</p> <ol style="list-style-type: none"> 1. Import a variety of data formats into R. 2. Execute statistical analyses with R. 3. Apply data science concepts and methods using R to solve problems in real-world contexts and will communicate these solutions effectively. <p>Basic R Programs:</p> <ol style="list-style-type: none"> 1. Find the factorial of a number 2. Check whether a number is prime or not 3. Find Sum, Mean and Product of Vector 4. Generate Random Number from Standard Distributions 5. Find Minimum and Maximum 6. Check Armstrong Number 7. Sum of Natural Numbers Using Recursion 8. Print the Fibonacci Sequence 9. Check for Leap Year 10. Check whether number is Odd or Even 11. Check if a Number is Positive, Negative or Zero 12. Find the Sum of Natural Numbers 13. Convert Decimal into Binary using Recursion in R 14. Find the Factorial of a Number Using Recursion 15. R Program to Find H.C.F. or G.C.D. <p>Data Visualization basic practical's:</p> <p>Download mtcars dataset in R. (also available on GitHub) and create the following graphics:</p> <ol style="list-style-type: none"> 1. Create a pie chart showing the proportion of cars from the mtcars data set that have 			

different cylinder (cyl) values.

2. Create a bar graph, that shows the number of each carb type in mtcars.
3. Show a stacked bar graph of the number of each gear type and how they are further divided out by cyl.
4. Draw a scatter plot showing the relationship between wt and mpg.

Design a visualization of your choice using the data and write a brief summary about why you chose that visualization.

Note: Students should certify & enclose minimum 10 programs in journal.

CCL 607	Major Project	Credit:-5	Marks:125
Marks:125	Total Hours of working on Project :75	External : 100	Internal: 25

Guidelines for Major Project Work :

Number of Copies: The student should submit two Hard-bound copies of the Project Report.

Acceptance/Rejection of Project Report:

The student must submit an outline of the project report to the college for approval. The college holds the right to accept the project or suggest modifications for resubmission. Only on acceptance of draft project report, the student should make the final copies.

Format of the Project Report:

The student must adhere strictly to the following format for the submission of the Project Report.

a. Paper:

The Report shall be typed on white paper, A4 size, for the final submission. The Report to be submitted to the must be original and subsequent copies may be photocopied on any paper.

b. Typing:

The typing shall be of standard letter size, 1.5 spaced and on one side of the paper only. (Normal text should have Arial Font size 11 or 12. Headings can have bigger size).

c. Margins:

The typing must be done in the following margins:

Left -----1.5 inch, Right ----- 1 inch

Top ----- 1 inch, Bottom ----- 1 inch

d. Front Cover:

The front cover should contain the following details:

TOP : The title in block capitals of 6mm to 15mm letters.

CENTRE: Full name in block capitals of 6mm to 10mm letters.

BOTTOM: Name of the University, Course, Year of submission -all in block capitals of 6mm

to 10mm letters on separate lines with proper spacing and centering.

f. Blank Sheets:

At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

Appendix - 2

- Input Design
- Report Design
- Implementation
- Testing

Standard Project Report Documentation Format

- a) Covering Page
- b) Institute/College certificate
- c) Guide Certificate
- d) Student declaration
- e) Acknowledgement
- f) Index (Chapter Scheme)
- g) Chapter Scheme (Index)
 - 1) Introduction to Project
 - Introduction
 - Existing System
 - Need and scope of System
 - Organization Profile
 - 2) Proposed System
 - Objectives
 - Requirement Engineering.
 - Requirement Gathering.
 - SRS
 - 3) System Diagrams
 - DFD
 - ERD
 - UML(if applicable)
- System Requirements
 - Hardware
 - Software
- 4) System Design
 - Database Design
 - Input Design
 - Output Design
- 5) User Guideline
 - Installation process
- 6) Source Code
- 7) Outputs-
Input screens and Reports (with valid Data)
- 7) Conclusion and Suggestions
 - Conclusion and suggestions

- Future enhancement

Bibliography:

Note : Minimum 5 reports are essential as outputs of the project work done by the student..