# Bachelor of Computer Application (BCA)
**Under the Faculty of Commerce &Management**
## Choice Based Credit System (CBCS)
Regulations in accordance with National Education Policy to be implemented from
**<u>AcademicYear 2024-Onwards</u>**

**SHIVAJI UNIVERSITY, KOLHAPUR - 416 004, MAHARASHTRA**

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**शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४, महाराष्ट्र**

दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग – ०२३१-२६०९०९४

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

जा.क्र./शिवाजी वि./अ.मं./     № **0 0 1 6 9**   दि. **12 SEP 2022**

प्रति,

    मा. प्राचार्य/संचालक,
    सर्व संलग्नित महाविद्यालये/संस्था,
    शिवाजी विद्यापीठ,
    कोल्हापूर

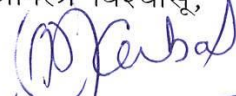    **विषय :** नवीन राष्ट्रीय शैक्षणिक धोरण २०२० नुसारची शैक्षणिक नियमावली.

महोदय/महोदया,

    आपणास विदित आहे की, नवीन राष्ट्रीय शैक्षणिक धोरण २०२० या शैक्षणिक वर्षापासून लागू करण्यात आले आहे. विद्यापीठ अधिकार मंडळानी नवीन शैक्षणिक धोरणानुसार शैक्षणिक नियमावलीस मंजुरी दिली आहे. सदर नियमावली शैक्षणिक वर्ष २०२२—२३ पासून लागू केली आहे. सोबत सदर नियमावलीची प्रत जोडली आहे. तसेच सदरची नियमावली विद्यापीठाच्या **www.unishivaji.ac.in** (Online Syllabus) या संकेतस्थळावर उपलब्ध आहे. सदर नियमावली सर्व संबंधितांच्या निदर्शनास आणावी.

    नवीन शैक्षणिक धोरणात वेळोवेळी होणा—या बदलांच्या अनुषंगाने नियमावलीत आवश्यकते बदल करण्यात येतील. व ते आपल्या निदर्शनास आणले जातील.

    कळावे,

आपला विश्वासू,

उपकुलसचिव

प्रत :   माहितीसाठी.
    १. स्वीय सहाय्यक, मा. कुलगुरु कार्यालय
    २. स्वीय सहाय्यक, मा. प्र. कुलगुरु कार्यालय.
    ३. स्वीय सहाय्यक, मा. कुलसचिव कार्यालय.
     माहितीसाठी व पुढील योग्यत्या कार्यवाहीसाठी

१. मा. संचालक, परीक्षा व मुल्यमापन मंडळ, कार्यालय
२. अधिष्ठाता, वाणिज्य व व्यवस्थापन विद्याशाखा.
३. अधिष्ठाता, मानवविज्ञान विद्याशाखा.
४. प्र. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा.
५. प्र. अधिष्ठाता, आंतरविद्याशाखीय अभ्यास विद्याशाखा
६. परीक्षक नियुक्ती विभाग.
७. संलग्नता टी. १ व २ विभाग.
८. पी.जी. आस्थापना विभाग.

९. पी. जी. प्रवेश विभाग.
१०. दूरशिक्षण केंद्र.
११. पात्रता विभाग.
१२. संगणक केंद्र./आय. टी. सेल.
१३. सभा विभाग.
१४. पी. जी. बी. यु. टी. आर. विभाग.
१५. सर्व ऑन परीक्षा विभाग.

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**Structure of Program and Evaluation are as follows:**

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**BCA–III**

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| Sr. No | Subject code | Teaching Scheme | | | | | | Examination Scheme | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | | | Practical | | | Theory | | | | | | | | Practical | | |
| | | | | | | | | Theory | | | Internal | | | Total | | Total | | |
| | | No. of lectures | Hours | Credits | No. of Lectures | Hours | Credits | Max. | Min. | Hours | Max. | Min. | Hours | Max. | Min. | Max. | Min. | Hours. |
| **S E M E S T E R –V (Duration 6 month)** | | | | | | | | | | | | | | | | | | |
| 1 | **N22-571** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 2 | **N22-572** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 3 | **N22-573** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 4 | **N22-574** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 5 | **N22-575** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 6 | **N22-576** | - | - | - | 2 | 3.2 | 2 | - | - | - | - | - | - | - | - | 50 | 20 | 3 |
| 7 | **N22-577** | - | - | - | 2 | 3.2 | 2 | - | - | - | - | - | - | - | - | 50 | 20 | 3 |
| 8 | **4444** | - | - | - | 3 | 2.4 | 2 | - | - | - | - | - | - | - | - | 50 | - | - |
| **Total** | | **20** | **16** | **20** | 7 | **8.8** | **6** | **400** | - | - | **-** | - | - | **500** | - | **150** | - | - |
| **S E M E S T E R – VI (Duration 6 month)** | | | | | | | | | | | | | | | | | | |
| 1 | **N22-671** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 2 | **N22-672** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 3 | **N22-673** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 4 | **N22-674** | 4 | 3.2 | 4 | - | - | - | 80 | 32 | 3 | 20 | 08 | - | 100 | 40 | - | - | - |
| 5 | **5555** | | | | 3 | 2.4 | 2 | - | - | - | - | - | - | - | - | 50 | 20 | - |
| 6 | **N22-675** | - | - | - | 2 | 3.2 | 2 | - | - | - | - | - | - | - | - | 50 | 20 | 3 |
| 7 | **N22-676** | - | - | - | 2 | 3.2 | 2 | | | | | | | | | 50 | 20 | 3 |
| 7 | **N22-677** | - | - | - | | | 4 | - | - | - | - | - | - | - | - | 100 | 40 | - |
| **Total** | | **16** | **12.8** | **16** | | | **10** | **320** | - | - | **-** | - | - | **400** | - | **250** | - | **-** |
| **Grand Total** | | 36 | 28.8 | **36** | | | **16** | **720** | - | - | **-** | - | - | **900** | - | **400** | - | - |

- Student contact hours per week : **19.2** Hours (Min.)
- Theory Lectures : 48 Minutes Each
- Course list as per enclosed Annexure. : Practical Examination is semester wise.
- *Separate passing is mandatory for Theory, Internal, and Practical.*

- Total Marks for BCA.-III : **650+650=1300**
- Total Credits for BCA.-III(Semester III & IV) :**52**

# BCA Part III (Semester- V & VI)

| Course code | Name of Course | Course code | Name of Course |
|---|---|---|---|
| **Semester- V** | | **Semester- VI** | |
| N22-571 | Java Programming | N22-671 | Python |
| N22-572 | Data Warehousing and Data Mining | N22-672 | IT Security |
| N22-573 | Dot NET Technology | N22-673 | Elective-I<br>1. Internet of Things(IoT)<br>2. Android Programming<br>3. R Programming |
| N22-574 | Elective-I<br>1. Web Content Management (WordPress/Joomla)<br>2. Emerging Trends in Data Base<br>3. Linux | N22-674 | Elective-II<br>1. IT Management<br>2. Cloud Computing<br>3. Knowledge Management |
| N22-575 | Elective-II<br>1. Digital Marketing<br>2. Management Information System<br>3. E-Commerce | 5555 | Skill Development-V |
| 4444 | Skill Development-IV | N22-675 | Lab Course XI Based on Python |
| N22-576 | Lab Course-IX Based on Java Programming | N22-676 | Lab Course XII Based on Elective-I |
| N22-577 | Lab Course-X Based on Dot Net & Elective-I | N22-677 | Major Project |

| Subject Code: N22-571 | Java Programming | | |
|---|---|---|---|
| **Marks:100** | **Credit:-4** | **External :80** | **Internal:20** |
| **Course Outcomes :** | **The student will be able to:**<br>1. Understand the features of Java Language<br>2. Demonstrate Object-Oriented Programming using Java<br>3. Develop Multithreaded and Networking applications<br>4. Design GUI applications using AWT and Swing. | | |
| **Unit No.** | **Description** | | **No. of Periods** |
| Unit 1 | **Java Fundamentals**<br>Introduction to Java, History and Features of Java, C++ vs Java, SimpleJava 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, Access modifiers, static keyword, final keyword, STRING Manipulation, Array, | | 15 |
| Unit 2 | **Inheritance, Polymorphism and Encapsulation**<br>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**<br>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)<br><br>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:**<br><br>1. Java - The Complete Reference-Author – Herbert Schildt, LatestEdition – 11th Edition, Publisher – McGraw Hill Education<br><br>2. The Complete Reference-Herbert Schildt<br>3. Core Java An Integrated Approach (Black Book)-Dr. R.NageswaraRao | | |

| Subject Code: N22-572 | Data Warehousing and DataMining | | |
|---|---|---|---|
| **Marks:100** | **Credits:04** | **External :80** | **Internal:20** |
| **Course outcome** | After completion of this course students will be able to<br>1. Define the Data warehouse architecture and its Implementation.<br>2. Describe the Architecture of a Data Mining system.<br>3. Understand the various Data preprocessing Methods.<br>4. Perform classification and prediction of data | | |

| Unit No. | Descriptions | No. of Periods |
|---|---|---|
| Unit 1 | **Data Warehousing:**<br>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,<br>Fact constellations, Concept hierarchy, Online analytical processing- | **15** |
| Unit 2 | **Data Mining:**<br>Introduction of data mining - Definition and functionalities Issues inDM, Applications of data mining, KDD process.<br>Data Pre-processing: Data Pre-processing, Data cleaning, Data integration and transformation, Data reduction, Discretization andconcept hierarchy generation, Data mining Tasks | **15** |
| Unit 3 | **Data Mining techniques:**<br>Frequent item - set and association rule mining: apriori algorithm, useof sampling for frequent item- set tree algorithm, Graph sampling :frequent sub graph mining , tree mining ,sequence mining Classification and Prediction - Issues Regarding Classification andPrediction –<br>Classification by Decision Tree Introduction – BayesianClassification –<br>Rule Based Classification –Prediction – Accuracy and<br>Error Measures . | **15** |
| Unit 4 | **Cluster Analysis:**<br>Types of Data in Cluster Analysis, A Categorization of MajorClustering Methods, Partitioning Methods – K-Means and K-Medoids | **15** |
| | **References:**<br>**1.** Kimball, Ralph & et al, The Data Warehouse Lifecycle Toolkit,John Wiley & Sons, 2006.<br>**2.** Jiawei Han and MichelineKamber : "Data Mining Concepts and Techniques", 3rd Edition,Elsevier,2012.<br>**3.** Arun K. Pujari, "Data Mining",University Press.<br>**4.** PaulrajPonnian, "Data Warehousing Fundamentals", John Willey. | |

| Subject Code: N22-573 | | DOT NET Technology | | |
|---|---|---|---|---|
| Marks:100 | Credit :04 | | External :80 | Internal:20 |

| Course Outcomes | After completion of this course student should be able to-<br>    1. Understand features of C# DOT NET<br>    2. Implement various server controls for website development<br>    3. Apply validation and state management for interactive website development<br>    4. Design and develop dynamic web application using ADO.Net |
|---|---|

| UNIT No. | Description | No. of Periods |
|---|---|---|
| Unit 1 | **Introduction to .NET Framework**<br>1.1. Overview of .NET<br>1.2. Features of .NET<br>1.3. Managed and unmanaged code<br>1.4. Meta Data<br>1.5. .NET types and .NET object and name spaces<br>1.6. Architecture of DOT NET Framework: CLR, CTS, MSIL, JIT,CLS, FCL<br>1.7. Types of JIT<br>1.8 Visual studio .NET IDE | 15 |
| Unit 2 | **C# Basics**<br>2.1 Introduction to C#<br>2.2 Entry point method, command line arguments<br>2.3 Different valid forms of main()<br>2.4. Difference between .Exe and .DLL<br>2.5 Parameter Passing mechanism, Out parameter<br>2.6 Data types<br>2.7 Type Casting, Boxing & Unboxing<br>2.8 Partial class and implementation<br>2.9 Control structures | 15 |
| Unit 3 | **ASP .NET**<br>3.1. Asp.Net Server controls<br>3.2. Web form lifecycle<br>3.3.Validtion controls<br>3.4. Navigation controls<br>3.5 Response.redirect, server.response,<br>3.6 Cross page posting<br>3.7 State Management | 15 |
| Unit 4 | **ADO.NET**<br>4.1 Data Controls in ASP.Net<br>4.2 ADO.Net Classes-Connection, Command, DataReader, DataAdapter,Dataset<br>4.3 Connected and Disconnected architecture<br>4.4 Data binding using ADO.net<br>4.5 Report generation, simple and parameterized reports | 15 |
| | **Books Recommended:**<br>1. ASP .NET-The Complete Reference Tata MacGraw Hill<br>2. ASP.NET 4 Unleashed by Stephen Walther, Kevin Scott Hoffman, Sams Publishing | |

| Subject Code: N22-574 Elective-I | 2. Emerging Trends in Database and WebTechnology | | |
|---|---|---|---|
| Marks:100 | Credits: 4 | External:80 | Internal : 20 |
| Course Outcomes | By the end of this course, the students should be able to:<br>1. Use XML and AJAX for asynchronous data transfer.<br>2. Describe the role of JQuery in Web application.<br>3. Differentiate between SQL and NoSQL database system.<br>4. Analyze given data using MongoDB. | | |
| Unit No. | Description | | No. of Periods |
| Unit 1 | **Introduction to XML and AJAX**<br>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**<br>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**<br>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**<br>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**<br>1. Teach yourself XML in 21 days, Steven Holzner, Sams.<br>2. Foundations of AJAX, Ryan Asleson and Natahniel T. Schutta, Apress<br>3. Learning from jQuery: Building on Core Skills, 2013, CallumMacrae, O'Reilly<br>4. Professional NoSQL, Shashank Tiwari, 2011, Wiley<br>5. Teach yourself NoSQL with MongoDB in 24 Hours, Brad Dayley, Sams | | |

| Subject Code: N22-574 Elective-I | 3. Linux | | |
|---|---|---|---|
| Marks:100 | Credits: 4 | External:80 | Internal : 20 |
| Course Outcomes | By the end of this course, the students should be able to:<br>1. Explain basic concepts of operating system.<br>2. Define process and file sub-systems.<br>3. Use basic Linux commands and shells.<br>4. Write elementary shell scripts | | |
| Unit No. | Description | | No. of Periods |
| Unit 1 | **Introduction**<br><br>Operating system, Types of operating system, Functions of operating system, History and development of Linux, Features of Linux, Login , logout procedure, Concept of shell, kernel, Kernel-shell relationship | | 15 |
| Unit 2 | **Handling files and directory's**<br><br>Concept of file, types, file system tree, Different GPU ( clear , cal, date, wc, who ), file handling- ls ,cat ,cp, mv , rm commands , listing file names, using meta characters ( * , ? ,[ ]), Concept of directory , home directory , directory handling commands- cd , mkdir, rmdir, pwd, Basic file attributes, change file/directory, chmod command, Filters-cut, paste, sort, unique, head, tail, grep commands, Command linking using pipe (\|) operator, command substitution | | 15 |
| Unit 3 | **VI editor**<br><br>Vi Editor, use of VI , features of VI, Different modes and working with VI editor, Command mode -cursor movements( k,j,h,l), delete( character, line, word),Screen up , down, use of repeat factor , joining lines (J), searching for pattern ( / and ?), Input mode- switching with (I,o,r,s,a,I,O,R,S,A), ex mode – saving ( w, x,q) | | 15 |
| Unit 4 | **Simple Shell programming**<br><br>Concept of Shell Script, running a shellscript, Statements – read , echo , test , if, case ,exit, Loopswhile, until, for Command linear arguments, Exit status of a command | | 15 |
| | **Reference Books**<br><br>1. Unix concept and applications --------- Sumitabha Das<br>2. Unix shell programming- Yashwant Kanetkar<br>3. Linux programming- Foreword By- Alan Cox<br>4. Red Halt Linux 718 By Bill Ball , David Pitts | | |

| Subject Code: N22-575 Elective-II | 1. Digital Marketing | | |
|---|---|---|---|
| **Marks:100** | **Credit: 04** | **External :80** | **Internal : 20** |

| **Course Outcomes (Cos):** | At the end of the course the student should be able to:<br>1. Learn the applications of Digital Marketing<br>2. Analyze the different digital marketingavenues.<br>3. Examine digital marketingtools.<br>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**<br> **1.Mobile Marketing**: Different kinds of mobile marketing ,mobile marketing ecosystem<br> **2. Social Media Marketing**: Different social Media Channels, Social media for various businesses B2C& B2B,Measuring social media ROI<br> **3. Content Marketing**: story telling in Social media<br> **4. E-Mail Marketing**: The basics of Email marketing<br> **5. Display Marketing**: Different Kinds of Display marketing , The display Marketing ecosystem | 15 |
| IV | **Affiliate Marketing**: Introduction, Meaning, Types of Affliate Mktg., Future of Digital Marketing, Technological advancements in Digital Marketing, Practical Applications of Digital Marketing. | 15 |

**Books Recommended:**
1. Gupta Seema.-Digital Marketing,McGraw Hill Education(India) Pvt.Ltd.
2. AhujaVandana-Digital Marketing,Oxford University Press, 2015.
3. MohammedR.,—InternetMarketing,McGrawHill,NewYork,Vol.4,2001
4. Krishnamurthy,S.&Singh,N.(2005),TheInternationalE-MarketingFramework(IEMF)

**Suggested Research Journal:**Vikalp – IIMAhmedabad

- Boudreau,M.-C.&Watson,R.T.(2006),InternetAdvertisingStrategyAlignmentInternet Research,16,23-37.
- ImportantDigitalMarketingChannelsYouShouldKnowAbout".DigitalDoughnut.Retrieved17 October2015.

| Subject Code: N22-575 Elective-II | 2. Management Information System | | | |
|---|---|---|---|---|
| Marks:100 | Credit: 04 | | External :80 | Internal : 20 |

| Course Outcomes (Cos): | After completion of this course students will be able to :<br><br>1. Understand the fundamental principles of information systems<br>2. Describe the types of management and decision making<br>3. Demonstrate different types of IS used in business.<br>4. Explain various applications of MIS |
|---|---|

| Unit No. | Description | No. of Periods |
|---|---|---|
| I | **Introduction to Information System**<br>• Introduction to systems- definition, need, types, characteristic Definition of Information<br>• Classification of Information<br>• Need and importance of information system<br>• Definition and Characteristics of information system<br>• Role of information system in business | 15 |
| II | **Decision Making**<br>• Decision Making Concepts, and Process, Types of Decisions<br>• Behavioral Concepts in Decision Making<br>• Organizational Decision-Making<br>• MIS and Decision Making | 15 |
| III | **Types of Information System**<br>• Introduction<br>• Operational and Knowledge Level- TPS (Transaction Processing System), OAS (Office Automation System),KWS (Knowledge Work System)<br>• Management and Strategic Level-<br>• MIS (Management Information System-need characteristics,<br>• DSS (Decision Support System)-need, characteristics, components,<br>• ESS (Executive Support System)-need, characteristics | 15 |
| IV | **Applications of MIS**<br>• Financial Information System<br>• Human Resource Information System<br>• Production Information System<br>• Marketing Information System | 15 |
| | **Reference Books:**<br>1. W. S. Jawadekar,Management Information Systems, 4th edition, McGrawHill.<br>2. Ramesh Behl , James O'' Obrien and George M. Marakas, Management<br>3. Information Systems, 10th edition, McGraw Hill edition. | |

| | 4. DR. Milind M. Oka. , Management Information Systems , Everest Publishing House | |
|---|---|---|

| Subject Code: N22-575 Elective-II | 3. E-Commerce | |
|---|---|---|
| **Marks:100** | **Credit: 04** | **External :80** **Internal : 20** |

| **Course Outcomes (Cos)**: | After completion of this course students will be able to: 1. Analyze the impact of E-commerce on business models and strategy. 2. Describe the major types of E-commerce. 3. Explain the process that should be followed in building an E-commerce presence. 4. Identify the key security threats in the E-commerce environment. 5. Describe how procurement and supply chains relate to B2B E-commerce. |
|---|---|

| Unit No. | Description | No. of Periods |
|---|---|---|
| I | **Introduction** E-Commerce- Concept, Definition, Goals, Components and functions, Advantages and Limitations, Challenges and opportunities, E-Commerce models-C2C, C2B, C2G, B2C, B2B,B2G, EDIConcept, components, Working mechanism of EDI, Advantages and disadvantages of EDI | 15 |
| II | **Electronic payment System** Concept of e-payment, Difference between traditional and electronics payment system, Digital cash, Credit and Debit card system, Smart Card, Prepaid, postpaid and instant payment system, Electronic funds transfer, Concept of e-banking | 15 |
| III | **E-Security** Concept of E-security, Security threats- concept and types, Malicious code, Phishing and identity theft, Hacking and cyber vandalism, Credit card fraud/Theft, Spoofing, Denial of service (DoS), Firewall and proxy server | 15 |
| IV | **Security Solutions** Concept of encryption and encryption, Symmetric and asymmetric key encryption, Cipher text, Digital Envelopes, Digital certificates, Security socket layer(SSL), Limitations of encryption solutions. | 15 |
| | **References:** 1. E-Commerce- Kenneth C. Laudon and Carol Guercio Traver 2. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam 3. E-Commerce Concepts , Models , Strategies by -- G.S.V. Murthy 4. E-Commerce by --Kamlesh K Bajaj and Debjani Nag 5. Electronic Commerce by --Gary P. Schneider 6. E-Commerce A Managers Guide, Ravi Kalkota | |

| Subject Code: N22-576 | Lab Course-IX Based on Java Programming | 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.<br>2. Implementation and Evaluation of concept related to class and inheritance, concept of Multiprogramming and ExceptionHandling. | | |
| | 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 | | |

| Subject Code:<br>N22-577 | Lab Course-X Based on Dot Net &<br>Elective-I | Credit :02 | Marks: 50 |
|---|---|---|---|
| **Course Outcomes** | After completion of this course student should be able to-<br>1. Design console applications using C#.<br>2. Design web application using ASP.Net | | |

| Sr. No. | List of Practical's |
|---|---|
| | **Console Applications** |
| 1. | Write a program to display even no and odd no using C#. |
| 2. | Write a program to demonstrate parameter passing mechanism and out parameter. |
| 3. | Write a program to demonstrate type casting. |
| 4. | Write a program to demonstrate partial class. |
| | **Web Applications** |
| 5. | Create web page using server controls- Textbox, List Controls, Calender, Imagebutton, Linkbutton |
| 6. | Develop ASP.Net Application through which user upload Image and that Image should be displayed in Image Control. |
| 7. | Write a program to create a web page showing use of following validation controls<br>   a. Required field validator<br>   b. Range validator<br>   c. Compare validator<br>   d. Custom validator<br>   e. Regular expression validator<br>   f. Validation summary |
| 8. | Write a program to create a web page passing multiple values between asp.net pages |
| 9. | Write a program to create a web page showing use of response, redirect and server transfer |
| 10. | Write a program to create a database for Medical shop system and represent data using Gridview. |
| 11. | Using ADO.NET, create a student database and perform operations like- insert, update and delete records. |
| 12. | Develop ASP.Net application for uploading Image. |
| 13. | Develop a ASP.Net application for recording Registration details using different controls & validators |
| 14. | Create application for displaying different reports. |

| Subject Code: N22-577 | Lab Course-X Based on Dot Net & Elective-I | 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-<br><br>1. Demonstrate and use different types of XML files.<br><br>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. | | |

# Semester- VI

| Subject Code: N22-671 | Python Programming | Credits: 4 | Marks:100 |
|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | External :80 | Internal : 20 |
| **Course Outcomes** | Students of this course will be able to :<br>1. Acquire programming skills in core Python.<br>2. Develop Python programs with conditionals and loops.<br>3. Understand advance datatypes in Python Programming.<br>4. Develop problem solving skills and their implementation through Python. | | |
| **Unit No.** | **Description** | | **No. of Periods** |
| Unit 1 | **INTRODUCTION TO PYTHON**<br>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**<br>Conditionals: Boolean Values And Operators, Conditional (If), Alternative (If-Else) ,Chained Conditional (If-Elif-Else)<br>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**<br>Lists-Create a List, Get and Set Items ,Add and Remove Items, List Slices, Different List Methods<br>TUPLES - Creation and Accessing Values, Updating Tuples, DeletingTuple Elements, Basic Tuples Operations, Indexing, Slicing<br>DICTIONARY- Accessing Values in Dictionary, Updating Dictionary,Delete Dictionary Elements, Properties of Dictionary Keys, Built-InDictionary Functions and Methods.<br>SETS **-**Concept of Sets, Creating, Initializing and Accessing the Elements, Sets Operation. | | 15 |
| Unit 4 | **MODULES, FILES I/O,GUI**<br>The Import Statement, Modules (Datetime, Calendar, Math Module)<br>Files I/O: Text Files, Reading And Writing Files<br>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 |

| Subject Code: N22-672 | IT Security | | Credit:-4 | Marks 100 |
| --- | --- | --- | --- | --- |
| Marks:100 | Total Hours of Teaching: 60 | | External :80 | Internal:20 |
| **Course Outcomes** | **The student will be able to:**<br>1. Understand the concept and need of IT security,<br>2. Identify different security threats to information systems.<br>3. Describe security controls used for IS security.<br>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**<br>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**<br>Introduction and types of security threats, sources of threats, Cyber Crimes.<br>    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)<br><br>Other Security Threats- Acts of God (Natural disaster), environmental hazards, Theft, User error, Hardware failure, Software failure. | | | 15 |

| | | |
|---|---|---|
| Unit 3 | **IT Security Control Measures**<br><br>        Identification, Access Controls/Authentication: Password Protection, Biometric verification, Intrusion detection and prevention system, Multilevel authentication.<br><br>        Antivirus, Recovery software and services, Data backups, Malware detectors, Logs. Cryptography-Types of Cryptography, Digital signature and certificate. Firewall System, Deception Technology<br><br>Control Measures for Internet Security | 15 |
| Unit 4 | **IT Act and Security Standards**<br>• IT Act 2000 and features of IT Act, Amendments in IT Act, Cyber-crimes under Information Technology Act 2000, Legal issues and challenges | 15 |
| | • Cyber security standards<br>• IS Audit and Security Policy | |
| | Reference Books:<br>1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – by Deven N. Shah, Wiley.<br>2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 2nd edition<br>3. Michael T. Simpson, Kent Backman, James Corley ―Hands- On Ethical Hacking and Network Defense‖,2016<br><br>4. Steven DeFino, Barry Kaufman, Nick Valenteen ―Official Certified Ethical Hacker Review Guide‖,2015<br><br>5. William Stallings, ―Principle of Computer Security‖, McGraw Hill Education, Fourth Edition, 2016.<br><br>6. AtulKahate, ―Cryptography and Network Security‖, Tata McGraw-Hill, 2003<br><br>7. Essential Computer Security: Everyone's Guide to Email, Internet and Wireless security", by Tony Bradley, Syngress Publication 2006<br><br>8. "Cryptography & Network Security", by Behrouz A. Ferouzan, Tata McGraw Hill, 2007.<br><br>9. Information & Network Security for GTU, I. A. Dhotre V. S. Bagad, Technical Publication, Edition 2018<br><br>10. Cyber frauds, cyber crimes and law in India by Pavanduggal.<br><br>11. Cyberlaw: The Law of the Internet and Information Technology, Brian Craig.<br><br>12. Information System Audit and Control by Ron Weber | |

| Subject Code:<br>N22-673<br>Elective-I | 1. Internet of Things | Credit:-4 | Marks 100 |
|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | External :80 | Internal : 20 |

**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**<br>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**<br>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**<br>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**<br>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, digitalRead() 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 applicationsand Protocols", Wiley, 2012.
2. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
3. CunoPfister, 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

| Subject Code: N22-673 Elective-I | 2.Android Programming | Credit:-4 | Marks 100 |
|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | External :80 | Internal : 20 |

**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** <br> 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** <br> 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** <br> 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** <br> 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.

| Subject Code: N22-673 Elective-I | 3. R Programming | Credit:-4 | Marks 100 |
|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | External :80 | Internal : 20 |

| Course Outcomes: | At the end of this course, student will be able to: <br> 1. Understand the fundamental syntax of R through practice exercises. <br> 2. Describe the control statements and functions in R. <br> 3. Analyze a data set in R and represent findings using the appropriate R packages. <br> 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 |

**Reference Books:**
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 Grolemund 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.

| Subject Code: N22-674 Elective-II | 1. IT Management | Credit:-4 | Marks 100 |
|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | External :80 | Internal : 20 |
| **Course Outcomes:** | After completion of course student will be able to: <br> 1) Understand IT assets and describe functions of IT Department <br> 2) Identify IT infrastructure components. <br> 3) Describe network infrastructure components and security management activities. <br> 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** <br> Introduction to IT, Components of IT, IT Assets, Types of IT Assets, Need and Significance of IT Asset Management. <br> Organization of IT Department – set up , roles & responsibilities , Interfacing with other functional departments , Functions of IT Management Department. <br> IT Professionals- Recruitment, Background checking, segregation of duties, compulsory vacation etc | | 15 |
| 2 | **IT Infrastructure Management** <br> 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. <br> 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:**<br><br>Network infrastructure Components, Selecting, installing, deploying, maintaining, and configuring all the network components in the infrastructure<br><br>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:**<br>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:**<br>1. Information Technology for Management : henry C. Lucas Jr. Tata McHill<br>2.  Information Technology Planning – Lori A.Goetsch - Jaiko Books<br>3. Planning & Financial Management of IT–Frank Bakhister–British Library catalogue in Publish of Data<br> 4. Information Technology for Management – John Wiley & SMS ( ASIA ) PAC Lts. Singapore | |

| Subject Code:<br> N22-674<br> Elective-II | **2. Cloud Computing** | | **Credit:-4** | **Marks 100** |
|---|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | | External:80 | Internal : 20 |
| 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<br> • Introduction<br> • Roots of Cloud Computing<br> • Layers and Types of Cloud<br> • Desired Features of a Cloud<br> • Platform as a Service Providers<br> • Architecture of cloud computing<br> • Challenges in the cloud<br> • Types of Cloud : Private,  Public, Hybrid | | | 15 |

| | | |
|---|---|---|
| Unit II | Virtualization<br>• Introducing virtualization and its benefits<br>• Implementation Levels of Virtualization<br>• Virtualization at the OS Model<br>• Virtualization Structure: Hosted Structure, Bare-Metal Structure<br>• Virtualization of CPU,Memory, and I/O Devices<br>• Virtualization in Multicore Processors<br>• Virtual Clusters and Resource management | 15 |
| Unit III | Cloud Computing Services<br>• Infrastructure as a Service<br>• Platform as a servive<br>• Leveraging PaaS for productivity<br>• Guidelines for selecting PaasPovider<br>• Concern with PaaS<br>• Language and PaaS<br>• Software as a Servive<br>• Database as a Service<br>• Specialized Cloud Services | 15 |
| Unit IV | Cloud Computing Applications<br>• Business Applications: MailChimp, Salesforce, Chatter,Paypal | 15 |

| Subject Code:<br>N22-674<br>Elective-II | **3. Knowledge Management** | | **Credits: 04** | | **Marks : 100** |
|---|---|---|---|---|---|
| Marks:100 | Total Hours of Teaching: 60 | | External :80 | | Internal : 20 |
| Course Outcomes | After completion of this course students will be able to -<br>1. Explain the fundamentals of knowledge management<br>2. Understand of the Knowledge Management life cycle.<br>3. Categorize the Knowledge Management tools.<br>4. Implement Knowledge Management in different sectors. | | | | |
| **Unit No.** | **Description** | | | | **No. of Periods** |
| I | **Introduction to Knowledge Management (KM):**<br><br>• History of Knowledge Management,<br>• Definition, scope and significance of Knowledge Management<br>• BasicTypes of Knowledge,<br>• Knowledge Management Processes<br>• Knowledge Management Systems<br>• Data-Information-knowledge-Wisdom relationship<br>• Organizational impact on knowledge management<br>• Factors influencing Knowledge Management. | | | | 15 |

| | Knowledge Management Life Cycle | |
|---|---|---|
| II | • Introduction & phases of Knowledge management life cycle<br>• Principles of Knowledge Management<br>• Techniques of Knowledge Management<br>• Knowledge Application Systems<br>• Knowledge Capture Systems<br>• Knowledge sharing systems<br>• Knowledge Discovery Systems | 15 |
| III | **Knowledge Management Techniques and Tools**<br><br>• Organizational knowledge creation- Knowledge network, knowledge mapping tools- visual thinking software, concept map,<br>• Knowledge Acquisition tools- e-mail, newsgroup, web-conferencing, IRC etc.<br>• Organizational knowledge processing<br>• Knowledge analysis- data mining, on-line data analytical processing | 15 |
| IV | **Knowledge Management and Industry perspective:**<br><br>• Role of Information Technology in Knowledge Management Systems<br>• Knowledge Management and E-commerce<br>• Bench marking and Knowledge Management<br>• Knowledge Management in Manufacturing and service industry,<br>• KM roles and Responsibilities within organizations,<br>• Future of Knowledge Management.<br>• Future challenges for KM.<br>• Careers in Knowledge Management | 15 |

| N22-675 | Lab Course-XI Based on Python Programming | 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-<br><br>1. Demonstrate and use different Datatypes in Python.<br><br>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. |

| N22-676 | Lab Course XI based on Elective-I | 1. 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 IoTapplications

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**

• **https://docs.arduino.cc/built-in-examples/**

| N22-676 | Lab Course XI based on Elective-I | 2. 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

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.

   - Text View

   - Edit Text

   - Button

   - Image View

4. Create Android Application to demonstrate following layouts:

   - 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 CURD operations on SQLite database. (Take any database example)

**Reference**

**https://www.tutorialspoint.com/android/index.htm**

| N22-676 | Lab Course XI based Elective-I | 3. R Programming | Credit:-4 |
|---|---|---|---|
| **Marks:100** | Total Hours of Teaching:60 | External : 100 | |

**Course outcomes**

CO1: Apply syntax of R through practice exercises.
CO2: Implement the control statements, functions, data visualization. in R.

**Practical's:**
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.

**Basic R Programs:**
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.

**Data Visualization basic practical's:**
Download **mtcars dataset in R**. (also available on GitHub) and create the following graphics:
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 furtherdivided 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.

| N22-677 | Major Project | Credit:-4 | Marks:100 |
|---------|---------------|-----------|-----------|
| Marks:100 | Total Hours of working on Project :60 | External : 80 | Internal: 20 |

**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.
> • **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.
> • **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).
> • **Margins:**

The typing must be done in the following margins:
Left -----1.5 inch, Right------ 1 inch
Top ----- 1 inch, Bottom ------ 1 inch
> • **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, onefor the purpose of binding and other to be left blank.
> > **Appendix - 2**
• Input Design
• Report Design
• Implementation
• Testing

> > **Standard Project Report Documentation Format**
• Covering Page
• Institute/College certificate
• Guide Certificate
• Student declaration
• Acknowledgement
• Index (Chapter Scheme)
• Chapter Scheme (Index)
> > > • Introduction to Project
> -Introduction
> -Existing System
> -Need and scope of System
> -Organization Profile

- Proposed System
  -Objectives
  -Requirement Engineering.
- Requirement Gathering.
- SRS
  - System Diagrams
- DFD
- ERD
- UML(if applicable) System Requirements
- Hardware
- Software
  - System Design
- Database Design
- Input Design
- Output Design
  - User Guideline
  - Installation process
  - Source Code
  - 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.**