**Proposal for**

****

**Bachelor of Computer Application**

**Cloud Technology and Information Security**

**2022 - Onwards**

**Program Designed**

**By**



**iNurture Education Solutions Pvt. Limited, Bangalore.**

\**Approved by AC &BOM vide resolution no.\_\_\_\_\_\_\_\_\_\_\_ & dated \_\_\_\_\_\_\_\_\_\_\_ Whenever, these Regulations are silent, the University Regulations for Examination and Evaluation will be applicable*

# Program Name

Bachelor of Computer Application in Cloud Technology and Information Security

**Level:** Undergraduate Program

**Program Duration:** 3 Years

# Scope of the Program

This unique program provides dual career options for the students in the fast-growing technology sectors of Cloud Technology and Information Security. In addition to all the mandatory subjects of a traditional undergraduate program, this specialized program offers in-depth practical know-how of the current trend Technology –Cloud Technology and Information Security. These sectors have the potential to grow exponentially and they provide challenging job opportunities for young professionals with the right skill sets.

# Program Introduction

**Cloud Technology** is the delivery of computing services like servers, storage, databases, networking, software, analytics and more over the Internet, “The Cloud”. Due to exponential growth of Internet, many companies are finding it beneficial to buy computing services than managing it on their own.

Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you are billed for water or electricity at home. Some of the major service providers are Amazon, Microsoft, Google and Salesforce.com. The primary business service models being deployed (such as software, platform, and infrastructure as a service) and common deployment models employed by service providers and users to use and maintain the cloud services (such as the private, public, community, and hybrid clouds) needs to be understood by the professionals who are trying to launch a career in cloud.

**Information Security** is an important area of study in the current Digital Information Age and focuses on protection of digital information. Information Security is the area of study involving technologies, processes, frameworks, conceptual models and practices designed to protect data, communication, devices (computers, phones, sensors etc), programs and applications from attack, damage or threats.

Information Security degree program prepares students to obtain knowledge for new age career opportunities in information security and information assurance. The program consists of topical areas dealing with concepts of information security, risk assessment, policies, procedures, security controls and countermeasures, incidents response, web application security, importance of programming knowledge in security, security management and governance which require students to acquire knowledge, understand and contextually apply the learning.

The program offers a wide range of technical and programming skill sets that complement the specialization subjects on Cloud and Security.

# Need for the Program

**Cloud Technology**

Worldwide end-user spending on public cloud services is forecast to grow 18.4% in 2021 to total $304.9 billion, up from $257.5 billion in 2020, according to Gartner, Inc. The increased use of public cloud services has reinforced cloud adoption to be the 'new normal,' now more than ever. Before cloud computing, companies had to store all their data and software on their own hard drives and servers. The bigger the company, the more storage they needed. It's not just businesses that benefit from cloud computing. The cloud has transformed our lives as individuals as well. Many of us use cloud services every day.

When we update our status on social media, binge a new streaming series, or check our bank accounts we're most likely using applications that are hosted by cloud services. These apps are accessed through an internet connection rather than installed on our hard drives or devices.

Today, cloud technology means that companies can scale and adapt at speed and scale, accelerate innovation, drive business agility, streamline operations, optimize resource utilization and reduce costs. This can propel companies leading to increased, sustainable growth. According to our Future Systems research, companies that are more strategic in their approach to technology are doing better financially. They're achieving more than twice the average revenue growth of companies who are slow to implement and use their tech. In fact, 95 percent of leaders have adopted sophisticated cloud services.

**Information Security**

**Global Scenario**

The need for studying information security in a formal degree program has seen an exponential growth in the last decade mostly fuelled by explosion in the use of Internet, extensive penetration of smartphones, increasing use of e-commerce, e-banking and the social media. Information Security plays a vital role in ensuring the safety of digital economy. Today Information Security has become an important enabler for the growth engine of a country’s development and economy. Hence any attack or threat on Information security impacts the growth directly or indirectly.

* **Markets and markets** – The cyber security market size was valued at $104.60 billion in 2017 and is projected to reach $258.99 billion by 2025, growing at a CAGR of 11.9% from 2018 to 2025.
* The major forces driving the cyber security market are strict data protection directives and cyber terrorism. The cyber security market is growing rapidly because of the growing security needs of Internet of Things (IoT) and Bring Your Own Device (BYOD) trends, and increased deployment of web and cloud-based business applications
* Demand for cyber security solutions and products are expected to increase as cyber threats and cyber-crimes continue to grow with North America being the world's largest market for cyber security, while emerging markets in APAC will have a huge opportunity
* The need for government, military, financial organizations, hospitals, corporations, education institutions and other organizations to protect confidential data (both digital and non-digital) is one of the major factors that drive the cyber security market
* Cybersecurity Ventures predicted that cybercrime will cost the world $6 trillion annually by 2021, up from [$3 trillion in 2015](https://cybersecurityventures.com/hackerpocalypse-original-cybercrime-report-2016/).

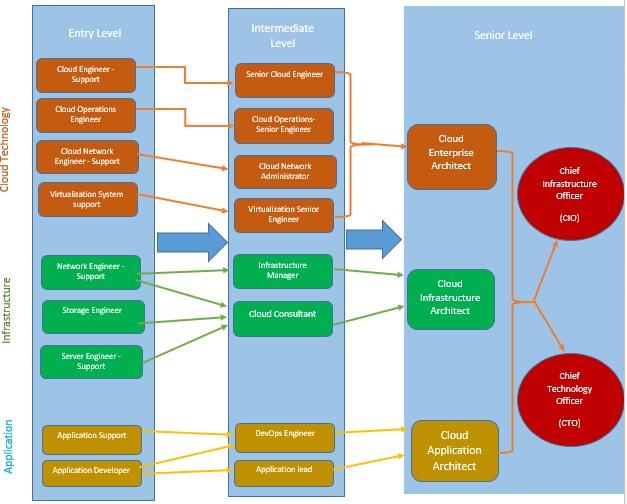
**Indian Scenario**

India cyber security market is expected to grow at an impressive rate during the forecast period. The India cyber security market is driven by the increasing incidences of cyber-attacks and data breaches. This has increased the need to deploy strong authentication systems and cyber security solutions across enterprises thereby fostering the market growth over the next few years. Additionally, ongoing technological advancements and new cyber security solution launches by the major vendors operating in the market is expected to create lucrative opportunities for the market growth through 2025.

* National Cyber Security Policy and RBI’s recent directive to banks and financial institutions on cyber security framework
* Government of India’s initiative on developing cyber security standards for mobile phones

# Career Outcomes

**Career Path – Cloud Technology**



# Program Highlights

* The program offers unique combination of two technologies - Cloud Technology and Information Security.
* The Program is designed to impart conceptual and practical knowledge of Cloud Technology and Information Security that will generate many **employment opportunities and open doors for entrepreneurship.**
* The Program is organized with balanced combination of theory, application-based lab sessions, state-of-the-art learning management platform. Assessments and industry- oriented interdisciplinary projects to provide a great learning experience.
* The Program offers a unique value proposition by blending the subject expertise of Cloud Technology and Information Security along with UI/UX for better designing of product.
* This Program is primarily aimed at offering student’s flexibility in making their own career choices in programming or Cloud Technology and Information Security.
* The program offers a good blend of soft skill, technology and life skill subjects that helps in improving the personality, building good character and employment quotient significantly.

**Teaching Learning Process / Methodology**

* Our **scientifically designed syllabus and curated and in-house developed content** is delivered through a synchronised blended mode including classroom and Lab training, state-of-the-art learning management platform with multiple learning artefacts to help students make learning more joyful and deep.
* Our **Industry Immersion and Corporate Relation** team of experts from various facets of IT and Management continuously supplement student learning with Guest Lectures, Experiential Workshops, Boot-camps, Seminars and Conferences, Hackathons, Make-a-thons, Ideathons, etc. and give a holistic and industry-orientation to our programs.
* We help students to continuously measure their employability and enrol for skill enhancement programs through an **AI-powered Employability Enhancement and Student Engagement platform**.

# Program Educational Objectives (PEOS)

The program educational objectives are set in line with Institutional and Departmental mission statements. The program educational objectives of Bachelor of Computers are to produce Computer Graduate who takes the responsibility with following qualities:

**PEO1.** Apply basic knowledge of mathematics, principles of physics and chemistry for design and development.

**PEO2.** Demonstrate the application of exploration practices through development of innovative tools that are beneficial in production.

**PEO3.** Exhibit skills of design and construct machineries based on requirement and need of Technology operations.

**PEO4.** Exhibit strong, independent learning, analytical and problem solving skills with special emphasis on design, communication, and ability to work in teams.

**PEO5.** To have successful career as computer professional through lifelong learning in the field of Bachelor of Computer.

# Graduation Attributes (GAs)

The graduate attributes in BCA are the summation of the expected course learning outcomes mentioned in the end of each course. Some of them are stated below.

**GA1: Discipline-specific Knowledge:** Capability of demonstrating comprehensive knowledge of BCA program and understanding of core branch so that it forms a foundation for a graduate program of study.

**GA2: Critical Thinking & Analytical Reasoning:** Ability to employ critical thinking in understanding the concepts relevant to the various branches of engineering. Ability to analyze the results and apply them in various problems appearing in different streams.

**GA3: Research-related skills:** To develop a sense of inquiry and capability for asking relevant and intelligent questions, problem identification, synthesizing and articulating; ability to recognize and establish cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

**GA4: Problem Solving:** Capability to solve problems by using research-based knowledge and research methods including innovative thinking, design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**GA5: Usage of Modern Tools (Information/digital literacy):** To create, select, and apply appropriate techniques, resources, and modern science and IT tools including prediction and modeling to complex science activities with an understanding of the limitations.

**GA6: Multicultural Competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

**GA7: Self-directed learning with Environment :** Ability to work independently and do in-depth study of various problems and requirements of society with natural available resources and sustainable development.

**GA8. Moral and ethical awareness/reasoning:** Ability to identify unethical behavior such as falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects of their program.

**GA9. Leadership Readiness/Qualities:** Capability for mapping out the tasks in a team or an organization, self-motivating and inspiring team members to engage with the team objectives/vision; and using management skills to follow the mapped path to the destination in a smooth and efficient way.

**GA10: Communication skills:**

* Ability to communicate various concepts of technical education effectively using practical approach and their geometrical visualizations.
* Ability to use courses as a precise language of communication in other branches of human knowledge.
* Ability to resolve unsolved problems and requirements of industries and societies
* Ability to show the importance of their technical knowledge as precursor to various scientific developments since the beginning of the civilization.

**GA11: Project Management and Finance:** Ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**GA12: Lifelong learning:** Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

# Qualification Descriptors (QDs)

The qualification descriptor suggests the generic outcomes and attributes to be obtained while obtaining the degree of BCA.The qualification descriptors indicate the academic standards on the basis of following factors:

* Level of knowledge
* Understanding
* Skills
* Competencies and attitudes
* Values.

These parameters are expected to be attained and demonstrated by the learners after becoming graduates in this program. The learning experiences and assessment procedures should be so designed that every graduate may achieve the program learning outcomes with equal opportunity irrespective of the class, gender, community and regions. Each technical graduate should be able to:

* Demonstrate fundamental systematic knowledge and its applications. It should also enhance the subject specific knowledge and help in creating jobs in various sectors.
* Demonstrate educational skills in areas of their program.
* Apply knowledge, understanding and skills to identify the difficult/unsolved problems in courses of their program and to collect the required information in possible range of sources and try to analyze and evaluate these problems using appropriate methodologies.
* Apply one’s disciplinary knowledge and skills in newer domains and uncharted areas.
* Identify challenging problems and obtain well-defined solutions.
* Exhibit subject-specific transferable knowledge relevant to job trends and employment opportunities.

# Program Learning Outcomes (PLOs)

Students graduating with the BCA degree should be able to acquire.

1. **Technical knowledge**: Apply the knowledge of mathematics and science fundamentals to the solution of complex technical problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex technical problems reaching substantiated conclusions using first principles of mathematics and sciences.
3. **Design/development of solutions**: Design solutions for complex technical problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern technical and IT tools including prediction and modeling to complex technical activities with an understanding of the limitations.
6. **The technocrat and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional technical practice.
7. **Environment and sustainability**: Understand the impact of the professional technical solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the technical practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex technical activities with the technical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the technology and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Lifelong learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Mapping of Graduate Attributes (GAs) and Program Learning Outcomes (PLOs):**

| **PLO/**  **PGA** | **GA1** | **GA2** | **GA3** | **GA4** | **GA5** | **GA6** | **GA7** | **GA8** | **GA9** | **GA10** | **GA11** | **GA12** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PLO1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO3** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO4** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO5** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO6** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO7** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO8** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO9** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO10** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO11** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PLO12** |  |  |  |  |  |  |  |  |  |  |  |  |

# Program Specific Outcomes (PSO’s) :

**PSO1:** Professionally empowering the student as technical manpower in industry or an entrepreneur for production analytics and innovation.

**PSO2:** Able to excel in various technological challenges and contribute for self-reliant society.

# Types of Courses

## 1. Courses in a programme may be of four kinds: Core, Elective, Ability Enhancement and Skill Enhancement.

1. **Core Course:** There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a requirement to complete the programme in a said discipline of study.
2. **Elective Course:** Elective course is a course which can be chosen from a pool of papers. It may be
   * + - Supportive to the discipline of study
       - Providing an expanded scope
       - Enabling an exposure to some other discipline/domain
       - Nurturing student’s proficiency/skill.

An Elective Course may be ‘Discipline Centric/Specific’ & Generic Elective

* Discipline Centric/Specific Elective (DSE): Elective courses offered under the main discipline/subject of study is referred to as Discipline Centric/Specific.
* Generic/Open Elective (GE): An elective course chosen from an unrelated discipline/subject is called Generic/Open Elective. These electives will be focusing on those courses which add generic proficiency of students.

1. **Ability Enhancement Compulsory Courses (AECC):-**

AECC courses are based upon the content that leads to knowledge enhancement, for example: English Communication, Environment Science/ Studies, etc.

1. **Skill Enhancement Courses (SEC):-**

SEC Courses provide value based and/or skill based knowledge and may content both Theory and Lab/Training/Field Work. The main purpose of these courses is to provide students life- skills in hands- on mode so as to increase their employability.

## 2.List of Courses (BCA-CTIS):

**Core Course:-**

* Theory of Mathematics (BCACT 101)
* Computer Architecture & Organization (BCACT 102)
* Programming in C (BCACT 103)
* Operating Systems (BCACT 104)
* UNIX and Shell Scripting(BCACT 105)
* Lab1: Programming in C (BCACT 107)
* Lab2: Operating System Lab (BCACT 108)
* Lab3: Unix Shell Scripting LAB(BCACT 109)
* Data Structures Using C (BCACT 201)
* Object Oriented Programming Using Java (BCACT 202)
* Database Management System (BCACT 203)
* Computer Networks (BCACT 204)
* Environmental Studies (BCACT 206)
* Lab1: Data Structure Using C (BCACT 207)
* Lab2: Object Oriented Programming Using Java (BCACT 208)
* Lab 3: Database Management System (BCACT 209)
* Client Side Scripting (BCACT 301)
* Cloud Computing (BCACT 302)
* Information Security (BCACT 303)
* Storage and Datacenter (BCACT 304)
* Server Administration(BCACT 305)
* Lab1: Client Side Scripting Lab (BCACT 307)
* Lab2: Server Administration(BCACT 308)
* Lab3: Storage and Datacenter (BCACT 309)
* Software Engineering (BCACT 401)
* Server Side Scripting (BCACT 402)
* Principles of Virtualization (BCACT 403)
* Ethical Hacking (BCACT 404)
* Network Security (BCACT 405)
* Lab1: Principles of Virtualization (BCACT 407)
* Lab2: Network Security (BCACT 408)
* Lab3: Ethical hacking (BCACT 409)
* Power Shell Scripting (BCACT 501)
* Database Security Fundamentals ( BCACT 502)
* Cloud Web Services (BCACT 503)
* Cloud Security (BCACT 504)
* Digital Forensics and Investigation (BCACT 505)
* Lab1: Digital Forensics and Investigation (BCACT 507)
* Lab2: Cloud Web Services (BCACT 508)
* Summer Project Seminar (BCACT 509)
* Infrastructure Solutions on Cloud (BCACT 601)
* IT Governance & Risk Management (BCACT 602)
* Lab 1: Infrastructure Solutions on Cloud (BCACT 603)
* Major Project/Internship (BCACT 604)

*\* Approved by AC vide resolution no. ……………… dated ……………..*

**ELECTIVE COURSE (Discipline Centric)**

* A:Infrastructure Solutions on Cloud (BCACT 601)
* B: Network Administration (BCACT 601)
* C: Infrastructure Automation (BCACT 601)

**ELECTIVE COURSE (OPEN/GENERIC ELECTIVE)**

* A: Security Threats and trends (BCACT 602)
* B: Disaster Recovery and Business continuity (BCACT 602)
* C: Security Architecture (BCACT 602)
* D: IT Governance & Risk Management (BCACT 602)

**ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)**

* Logical Reasoning and Thinking (BCACT 406)
* Environmental Studies (BCA 206)
* Personality Development (BCACT 205)
* Business Communication & Presentation Skills (BCACT 306)

**SKILL ENHANCEMENT COURSE**

* English & Communication Skills (BCACT 106)
* Working Towards Placements (BCACT 506)

**Computation of Workload:**

**Lecture (L):**1 Credit = 1 Theory period of one-hour duration

**Tutorial (T):**1 Credit = 1 Tutorial period of one-hour duration

**Practical (P):**1 Credit = 1 Practical period of two-hour duration

# Program specific outcomes (PSOs):

**Students will be able to:**

* 1. Demonstrate the ability to solve complex problems of development in the fields of Computer Science and its allied branches.
  2. Design and develop cloud-based solutions to IT infrastructure, platform and application issues, using acquired knowledge and modern tools. Apply information security principles and procedures to secure all kinds of IT infrastructure.
  3. Formulate solutions for disciplinary and interdisciplinary problems through acquired knowledge in the respective domains complying with real-time constraints.

# Course Structure (BCA in Cloud Technology & Information Security)

| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | |
| **First SEMESTER** | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  |
| **Code** | **Subject/Paper** |  | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 101 | Mathematics – I | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 102 | Operating System | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 103 | Computer Fundamentals and Organization | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 104 | Programming in C | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 105 | English – I | SEC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 106 | Web Technologies | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 107 | Lab-1: Operating System | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 108 | Lab -2: Programming in C | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 109 | Lab-3: Web Technologies | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| **TOTAL** | | | **18** | **0** | **6** | **270** | **480** | **750** | **21** |

| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | |
| **SECOND SEMESTER** | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  |
| **Code** | **Subject/Paper** |  | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 201 | Computer Networks | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 202 | Data Structures and Algorithms | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 203 | Object Oriented Programming With Java | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 204 | Data Base Management System | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 205 | Personality Development | AECC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 206 | Environmental Studies | AECC | 3 | - | - | 30 | 70 | 100 | 3 |
|  | \*(MOOC I) | - | - | - | - | - | - | - | - |
| ***PRACTICALS/VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 208 | Lab-1: Data Structures and Algorithms | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 209 | Lab -2: Object Oriented Programming With Java | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 210 | Lab-3: Data Base Management System | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| **TOTAL** | | | **18** | **0** | **6** | **270** | **480** | **750** | **21** |

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1. Every student is required to complete at least 2 MOOC courses within the duration of the whole programme.
2. A Student may choose any MOOC course from the Swayam Portal or any educational platform approved by the UGC/ Regulatory body from time to time at UG level as per the scheme of the programme.
3. After the completing the course, the Student has to produce successful course completion certificate for claiming the credits which will be reflected in his/her mark sheet.

| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | |
| **THIRD SEMESTER** | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  |
| **Code** | **Subject/Paper** |  | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 301 | Unix Shell Scripting | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 302 | Cloud Computing | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 303 | Information Security | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 304 | Storage in Data Center | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 305 | Server Administration | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 306 | Business communication and Presentation Skill | AECC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 307 | Lab-1: Unix Shell Scripting | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 308 | Lab -2: Storage in Data Center | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 309 | Lab-3 Server Administration | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| **TOTAL** | | | **18** | **0** | **6** | **270** | **480** | **750** | **21** |

| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | | |
| **Fourth SEMESTER** | | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  | |
| **Code** | **Subject/Paper** |  | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 401 | Software Engineering | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 402 | Server Side Scripting | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 403 | Principles of Virtualization | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 404 | Ethical Hacking | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 405 | Network Security | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 406 | Logical Reasoning and Thinking | AECC | 3 | - | - | 30 | 70 | 100 | 3 |
|  | MOOC II |  |  | - | - | - | - | 100 |  |
| ***PRACTICALS/VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 407 | Lab-1: Principles of Virtualization | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 408 | Lab-2: Network Security | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 409 | Lab-3: Ethical Hacking | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| **TOTAL** | | | **21** | **0** | **6** | **270** | **480** | **850** | **24** |

1. Every student is required to complete at least 2 MOOC courses within the duration of the whole programme.
2. A Student may choose any MOOC course from the Swayam Portal or any educational platform approved by the UGC/ Regulatory body from time to time at UG level as per the scheme of the programme.
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| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | |
| **FIFTH SEMESTER** | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  |
| **Code** | **Subject/Paper** |  | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 501 | Power Shell Scripting | CC | 3 | **-** | - | 30 | 70 | 100 | 3 |
| BCACT 502 | Database security fundamentals | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 503 | Cloud Web Services | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 504 | Cloud Security | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 505 | Digital Forensics and Investigation | CC | 3 | - | - | 30 | 70 | 100 | 3 |
| BCACT 506 | Working Towards Placements | SEC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS / VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 507 | Lab-1: Power Shell Scripting | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 508 | Lab-2: Cloud Web Services | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| BCACT 509 | Lab-3: Digital Forensics and Investigation | CC | - | - | 2 | 30 | 20 | 50 | 1 |
| **TOTAL** | |  | **18** | **0** | **6** | **270** | **480** | **750** | **21** |
|  | | | | | | | | | |

| **BACHELOR OF COMPUTER APPLICATIONS** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BCA CTIS** | | | | | | | | | |
| **SIXTH SEMESTER** | | | | | | | | | |
| **THEORY PAPERS** | | **Course Category** | **No. of Teaching Hours** | | | **Marks Allocation** | | |  |
| **Code** | **Subject/Paper** |  | L | T | **P** | **IA** | **EA** | **Total** | **Credits** |
| BCACT 601 | Infrastructure Solutions on Cloud | CC | 4 | - | - | 30 | 70 | 100 | 4 |
| BCACT 602 | IT Governance & Risk Management | CC | 4 | - | - | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | |  | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BCACT 603 | Lab-1:Infrastructure Solutions on Cloud | CC | - | - | 4 | 30 | 20 | 50 | 2 |
| BCACT 604 | Major Project/ Internship | CC | - | - | 20 | 100 | 50 | 150 | 10 |
| **TOTAL** | |  | **8** | **-** | **24** | **190** | **210** | **400** | **20** |
| **Grand Total of Credits** | |  | **101** | **0** | **54** | **1540** | **2610** | **4350** | **131** |

1. Every student is required to complete at least 2 MOOC courses within the duration of the whole programme.
2. A Student may choose any MOOC course from the Swayam Portal or any educational platform approved by the UGC/ Regulatory body from time to time at UG level as per the scheme of the programme.
3. After the completing the course, the Student has to produce successful course completion certificate for claiming the credits which will be reflected in his/her mark sheet.

## Semester-1

| **Course Code:** **BCACT 101 Course Title: L T P C**  **Mathematics – I 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. Understand vectors and matrices 2. Explain limits and functions and various series 3. Discuss differential equations of various equations 4. Understand Integral Calculus and partial differential equations |
| **Unit 1: Matrices**  Characteristic equation of a matrix ,Eigen values and Eigen vectors, Properties of Eigen values, Diagonalization of matrix, Cayley-Hamilton Theorem (without proof) verification, Finding Inverse and Power of a matrix using it.  **Unit-2: Evaluation of limits & Expansion of functions**  Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits Taylor's Series and Maclaurin's Series, Convergence Tests for positive term series – Comparison  **Unit 3: Differential Equations**  Ordinary differential equations of the first order of the form y'=f(x,y), Bernoulli’s equation, exact differential equations, integrating factor, orthogonal trajectories, homogeneous differential equations, variable separable equations, linear differential equations of second order with constant coefficients, Method of variation of parameters, Cauchy-Euler equation  **Unit-4: Integral Calculus**  Integration as the inverse process of differentiation, definite integrals, and their properties, fundamental theorem of calculus. Double and triple integrals, change of order of integration, calculating surface areas and volumes using double integrals, calculating volumes using triple integrals.  **Unit-5 : Partial differentiation & Application of PDE**  Partial Derivatives, Euler's Theorem on homogeneous functions, Total Derivatives & Implicit functions. Errors and Approximations, Maxima & Minima for two and several variables, Jacobians and their applications.  **Text Books**   1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication). 2. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co. 2003   **Reference Books**   1. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002 2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.). 3. T Veerarajan, Engg Mathematics McGraw-Hill Education (India) Pvt Limited, 2007 4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education) |
| **Expected Course Outcomes:**  **CO1:** Understand the basic concepts of Linear Equations and linear dependence.  **CO2:** Solve the functions using Taylor's Series and Maclaurin’s Series expansion.  **CO3:** Apply the concept of differential equations and how such equations are used in modelling. **CO4:** Apply the concepts of partial differentiation like maxima and minima for two and several variables, Jacobians and their applications. |

| **Course Code:** **BCACT 102 Course Title: L T P C**  **Operating Systems 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarize students with Operating System concepts and essential component for a better understanding of higher concepts. It's vital to know the computer's system software that manages  computer hardware, software resources, and provides common services for computer programs. |
| **Unit 1: Introduction to Operating System**  Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.  **Unit-2: Process Management**  Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. Threads: Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. Process Synchronization: Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock..  **Unit 3: Storage Managements**  Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. Virtual Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation File-System Interface: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics.  **Unit-4: File-System Implementation**  File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery Disk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation.  **Unit-5 : Protection and Security**   * Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Acess Matrix, Revocation of Access Rights, Capability- Based Systems, and Language – Based Protection. Security: Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications..   **Text Books**   * 1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.   2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.   3. Silberschatz / Galvin / Gagne, Operating System,6th Edition, WSE (WILEY Publication)   **Reference Books**   1. William Stallings, Operating System, 4th Edition, Pearson Education. 2. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education 3. Nutt: Operating Systems, 3/e Pearson Education 2004 4. Operating System by H.M.Deitel , 2nd Edition, Pearson Education |
| **Expected Course Outcomes:**  **CO1:** Learn to understand the structure and functions of OS.  **CO2:** Outline the basics of basic concepts and functions of operating systems. |

| **Course Code:** **BCACT 103 Course Title: L T P C**  **Computer Fundamentals and Organization 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. Understand how the computer stores the data and interprets the information and converts it into machine-understandable form 2. Explain processing, and renders the output in a human-readable format 3. Understand various registers and micro operations |
| **Unit 1: Register Transfer and Micro-operation**  C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations   * Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.   **Unit-2: Basic Computer Organization**  Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle. Register reference instructions. Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit.  **Unit 3: Central Processing Unit**  Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes. CISC & RISC  **Unit-4: Computer Arithmetic & I/O Organization** Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors. Modes of Data Transfer, Priority Interrupt, Direct Memory Access.  **Unit-5 : Memory Organization**  Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative, Memory, Cache Memory, Virtual Memory  **Text Books**   * 1. Computer System Architecture by Morris Mano, PHI Publication   **Reference Books**   1. Computer Organization and Architecture by William Stallings, PHI Publication 2. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O’Reilly, 2nd Edition , 2010 3. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL- REWNI, John Wiley and Sons 4. Fundamental of Computer Organization by Albert Zomaya, 2010 Edition |
| **Expected Course Outcomes:**  **CO1:** List the concepts of register transfer and micro-operation.  **CO2:** Outline the basics of computer organization and instruction execution.  **CO3:** Explain the various modes of data transfer.  **CO4:** Explore the system architecture of multiprocessor and multicomputer.  **CO5:** Interpret the various memory organization and I/O systems. |

| **Course Code:** **BCACT 104 Course Title: L T P C**  **Programming in C 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To provide a logical thinking with the help of the C programming language. 2. To facilitate the students to study about algorithms, flowcharts and programs 3. To solve problems through logical thinking and to learn programming using C 4. To stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code. |
| **Unit 1: Overview of Programming**  Introduction to computer based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters .  **Unit-2: Fundamentals of C programming**  Overview of C, Data Types, Constants & Variables, Operators & Expressions, Control constructs-if then, for, while, Arrays- single & multidimensional arrays, Functions-fundamentals – general form, function arguments, return value, Basic I/O-formatted and Unformatted I/O, Advanced features- Type modifiers and storage class specifies for data types, Bit operators, ? operator, &operator, \* operator, Type casting, type conversion.  **Unit 3: Advanced programming techniques**  Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi  **Unit-4: Dynamic data structures in C**  Pointers- The & and \* operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, Unions – Declaration, uses, enumerated data-types, typedef.  **Unit-5 : Additional features**  File Handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions  **Text Books**   1. Programming in ANSI C by Balaguruswamy, 3rd Edition,Tata McGraw Hill. 2. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication 3. The C programming Language by Richie and Kenninghan, BPB Publication. 4. Herbert Schildt, C: The complete Reference, Fourth Edition, Mc-Graw Hill.   **Reference Books**   1. Reema Thereja , Programming in C , Cengage publication 2. A. N. Kamthane, Programming with ANSI and Turbo C, Pearson Education 3. Programming With C, Schaum Series |
| **Expected Course Outcomes:**  **CO1:** Demonstrate the basic concepts of Computer components.  **CO2:** Design, implement, test, debug and document programs in C.  **CO3:** Illustrate functions, and functions with parameters passing option. **CO4:** Distinguish pointers and arrays, perform pointer arithmetic  **CO5:** Summarize the advance topics in C like file handling functions and the concept of Standard C library. |

| **Course Code: BCACT 105 Course Title: L T P C**  **English-I 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarizing the students with the English language's basics and its grammar |
| **Unit 1: Everyday conversations**   1. Introducing self/others 2. Weather 3. Classroom 4. Asking about facilities around 5. Asking for help, suggestions, ideas, directions and advice 6. Describing a person/thing   **Unit-2: Meeting people, expressing, and talking about**   1. Greetings, Starting the Conversation, Small Talks, Closing the Conversation 2. Happiness/Displeasure, Preference, Doubts, Views. 3. Interests, Different Cultures, Clothes, Cars, Institutes, Situations, Schedules, Prices Points to cover: Vocabulary, grammar, Construction of sentences, listening.   **Unit 3: Comprehension**   1. Comprehension passage 1 2. Comprehension passage 2 3. Comprehension passage 3 4. Comprehension passage 4 5. Comprehension passage 5   Points to cover: Vocabulary, grammar, Construction of sentences.  **Unit-4: Short Paragraph Writing**   1. Punctuality 2. Nutrition 3. Exercise 4. Global Warming 5. Disciple Inflation 6. Demonetization   Points to cover: Vocabulary, grammar, Construction of sentences.  **Unit-5 : Review Writing**   1. Topic 1 – Book [can be a story review for average students] 2. Topic 2 - Movie review [different kinds of movies can be suggested too for practice] 3. Topic 3 – Another Movie review 4. Topic 4 – Hotel / Café / Recreations Centre Review 5. Topic 5 – Electronic Gadget Review (Laptop/smartphone / speakers/ PSP/ etc.) 6. What is a review? How to write a review? Different types of reviews. 7. Writing for social media: Facebook, Inked-in 8. Points to remember while writing on social media. How to write a profile summary. 9. What is a blog? How to write a blog?   Points to cover: Vocabulary, grammar, Construction of sentences.  **Text Books**   1. Speak Now Level I & II, Oxford Press 2. Business Benchmark, Level – Upper Intermediate by Cambridge University Press. 3. Practical English Usage by Michel Swan, Oxford University Press. 4. Cambridge Grammar for English: A comprehensive Guide for spoken & written English (South Asian edition), Cambridge University Press. 5. How English Works by Michael Swan & Catherine Walter, Oxford University. |
| **Expected Course Outcomes:**  **CO1:** Develop one’s ability to use English Language in day-to-day and real-life situations  **CO2:** Interpret isolated vocabulary words and phrases in familiar contexts  **CO3:** Express ideas through written, oral and visual communication  **CO4:** Compose meaningful sentences and paragraphs as a prominent life-long skill.  **CO5:** Demonstrate excellent reading and comprehension skills |

| **Course Code: BCACT 106 Course Title: L T P C**  **Web Technologies 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To make students understand the fundamental concepts of Internet and Web Architecture 2. To make students know about working technology behind web development, HTML 5 and CSS 3 3. To make students understand about PHP and make them able to create dynamic web pages |
| **Unit 1: Introduction to the Internet and the World Wide Web**   * Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST * **Unit-2: HTML& CSS** * Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.   Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing, Points to cover: Vocabulary, grammar, Construction of sentences, listening.  **Unit 3: XML and HTML5, CSS3**   * Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM. * Introduction to HTML5,CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers Points to cover: Vocabulary, grammar, Construction of sentences.   **Unit-4: Practical website development**   * Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, web authoring tools, Web hosting, website maintenance, generating traffic to your website Points to cover: Vocabulary, grammar, Construction of sentences.   **Unit-5 : PHP Server side scripting**   * Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment & environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples * Points to cover: Vocabulary, grammar, Construction of sentences.   **Text Books**   1. Practical Web Design for Absolute Beginners, Adrian W. West. Apress 2016 2. Introducing Web Development, Jorg Krause. Apress 2017. 3. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010 4. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O‘Reilly 5. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009. |

| **Course Code:** **BCACT 107 Course Title: L T P C**  **Operating Systems Laboratory 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarize students with Operating System concepts and essential component for a better understanding of higher concepts. It's vital to know the computer's system software that manages  computer hardware, software resources, and provides common services for computer programs. |
| **Lab Experiments:**   1. Execute 25 basic commands of UNIX. 2. Basics of functionality and modes of VI Editor. 3. WAP that accepts user name and reports if user is logged in. 4. WAP which displays the following menu and executes the option selected by user:   1. ls 2. Pwd 3. ls –l 4. ps –fe   1. WAP to print 10 9 8 7 6 5 4 3 2 1 . 2. WAP that replaces all “\*.txt” file names with “\*.txt.old” in the current 3. WAP that echoes itself to stdout, but backwards. 4. WAP that takes a filename as input and checks if it is executable, if not make it executable. 5. WAP to take string as command line argument and reverse it. 6. Create a data file called employee in the format given below: 7. EmpCode Character 8. EmpName Character 9. Grade Character 10. Years of experience Numeric 11. Basic Pay Numeric   $vi employee  A001 ARJUN E1 01 12000.00  A006 Anand E1 01 12450.00  A010 Rajesh E2 03 14500.00  A002 Mohan E2 02 13000.00  A005 John E2 01 14500.00  A009 Denial Smith E2 04 17500.00  A004 Williams E1 01 12000.00   1. Perform the following functions on the file: 2. Sort the file on EmpCode. |

| **Course Code:** **BCACT 108 Course Title: L T P C**  **Programming in C Laboratory 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To provide a logical thinking with the help of the C programming language. 2. To facilitate the students to study about algorithms, flowcharts and programs 3. To solve problems through logical thinking and to learn programming using C 4. To stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code. |
| **Lab Experiments:**   1. Printing the reverse of an integer. 2. Printing the odd and even series of N numbers. 3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar(). 4. Input a string and find the number of each of the vowels appear in the string. 5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end. 6. Printing the reverse of a string. 7. Searching an element in an array using pointers. 8. Checking whether the given matrix is an identity matrix or not. 9. Finding the first N terms of Fibonacci series. 10. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable. 11. Define a structure with three members and display the same. 12. Declare a union with three members of type integer, char, string and illustrate the use of union. 13. Recursive program to find the factorial of an integer. 14. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers. 15. Arranging N numbers in ascending and in descending order using bubble sort. 16. Addition and subtraction of two matrices 17. Multiplication of two matrices 18. Converting a hexadecimal number into its binary equivalent. 19. Check whether the given string is a palindrome or not. 20. Demonstration of bitwise operations. 21. Applying binary search to a set of N numbers by using a function. 22. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.   **Text Books**   1. Programming in ANSI C by Balaguruswamy, 3rd Edition,Tata McGraw Hill. 2. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication 3. The C programming Language by Richie and Kenninghan, BPB Publication. 4. Herbert Schildt, C: The complete Reference, Fourth Edition, Mc-Graw Hill.   **Reference Books**   1. Reema Thereja , Programming in C , Cengage publication 2. A. N. Kamthane, Programming with ANSI and Turbo C, Pearson Education Programming With C, Schaum Series |
| **Expected Course Outcomes:**  **CO1:** Demonstrate the basic concepts of Computer components.  **CO2:** Design, implement, test, debug and document programs in C. **CO3:** Illustrate functions, and functions with parameters passing option. **CO4:** Distinguish pointers and arrays, perform pointer arithmetic  **CO5:** Summarize the advance topics in C like file handling functions and the concept of Standard C library. |

| **Course Code: BCACT 109 Course Title: L T P C**  **Web Technologies Lab 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To make students understand the fundamental concepts of Internet and Web Architecture 2. To make students know about working technology behind web development, HTML 5 and CSS 3 3. To make students understand about PHP and make them able to create dynamic web pages |
| **List of Experiments**:     * 1. Design a simple web page with head, body and footer, with heading tags, image tag.  1. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page. 2. Design a page to display the product information such as name, brand, price and etc with table tag 4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information. 3. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements. 4. Design a web page with nice formatting like background image, text colors and border for text using external CSS. 5. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division using form elements and Java Script. 6. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements and display them into other pages Page 50 B.Tech Data Science 2020 Batch using Java Script. 7. Design a web page to display timer in the left side of the web page using Java Script. 8. Design a web page to capture the student details such as student number, name, age, marks using Java Script Object. 9. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information. 10. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages. ∙ Home page ∙ Login page ∙ Signup page ∙ Product details page   **Course Outcomes**:  At the completion of the course students will be:   1. Practically use HTML 5 and CSS to develop web pages 2. Able to develop basic dynamic pages using PHP and MySQL 3. Able to provide a web solution for real life problem. |

## Semester-2

| **Course Code: BCACT 201 Course Title: L T P C**  **Computer Networks 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. It is important for networking professionals to have a sound grounding in the basics of networking and with the networking technology being developed thick and fast, the professionals need to be updated of them at all times. 2. The focus of this unit is providing a background to the basics of networking and its underlying principles. The learners taking this unit will explore the fundamentals of networking, the principle and purpose behind layered models, devices used in networks and their wireless connectivity and the ways to troubleshoot network related issues. 3. This course enables learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology and their troubleshooting mechanisms. |
| **Unit 1: Networking Fundamentals**  Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fibre optic, Coaxial, and TP etc.) Introduction of OSI model, Seven layers of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses.  **Unit-2: Basics of Network Devices**  Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components, Point-to-Point Protocol(PPP ),PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP,WPA, 802.1X, Installing a wireless LAN..  **Unit 3: Basics of Network, Transport and Application Layers**  Network Layer: Internet Protocol (IP ), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP ), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP ),Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP..  **Unit-4:**  **WAN Technology**  What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Other Security Appliances, Security Threats  **Unit-5 :**  **Network Operating Systems and Troubleshooting Network**  Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.  **Text Books**   1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011 2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013   **Reference Books**   1. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008 2. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010 |
| **Expected Course Outcomes:**  **CO1:**  Students will develop knowledge and skills required to take up vendor certifications in the networking domain . |

| **Course Code:** **BCACT 202 Course Title: L T P C**  **Data Structures and Algorithms 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To familiarize students with various data structures and algorithms 2. Learning data structures and algorithms allow us to write efficient and optimized computer programs. |
| **Unit 1: Introduction to Data structures**  Information and its Storage representation – Storage of Information, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), Linear Data Structures and their Sequential Storage Representation – Concepts and Terminology for Non-primitive Data Structures. Arrays: Definition – Terminology – One dimensional Array – Memory Allocation – Operations – Applications - Array as an ADT - Sparse Matrices - Row and Column major representation- Pointer Arrays. Recursion: Definition, Recursion in C (advantages), efficiency of Recursion, Writing Recursive programs – Binomial coefficient, Fibonacci, GCD. Tradeoffs between Iteration and recursion  **Unit-2: Stack and Queues**  Stacks – Definition and Concepts – Representation of Stack as an ADT - Array and Linked list representation. Operations on Stacks – Applications of Stacks - Recursion – Evaluation of Arithmetic Expressions – Conversion of Infix to Postfix Notation – Towers of Hanoi problem.  Queues: Introduction – Definition – Representation of queues - Array representation – Linked list Representation – Operations of queues - Types of Queues – Circular queue – Definition – Operations – Applications - Deque – Definition – Operations – Applications - Priority queue - Definition – Operations  – Applications- Array Implementation of Priority Queue – Application of General queues – Simulation  **Unit 3: Linked Lists**  Definitions – Types – Notion of position in lists - List ADT - Single Linked lists – Representation as an ADT - Operations - Circular Linked list – Primitive Operations on circular lists - Header Nodes, Doubly Linked Lists – Operations - Circular double linked lists - Operations – Applications of Linked lists – Sparse Matrix Manipulation – Polynomial Representation and Manipulation.  **Unit-4: Non- linear Data Structures – Trees**  Trees – Definitions and Concepts – Tree ADT, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary Tree: Types of Binary trees  - Operations on Binary trees – Storage Representation and manipulation of Binary Trees – Linear - Linked and Threaded Storage Representation for Binary trees – Conversion of General trees to Binary trees – Sequential and other Representation of trees – Applications – Manipulation of Arithmetic Expressions. Binary Tree traversal (In Order, Pre Order, Post Order) - Binary Tree Traversal in C. Finding the Kth element, Deleting an Element, Evaluating an Expression Tree Concept and basic operations of AVL Trees – Single & Double Rotation, B – trees- Definition of B-trees, Basic operations on B-trees, Deleting a key from a B-tree  **Unit-5 : Graphs**  Graphs and their Representation- Application of Graph – Definition, Graph Terminology - Matrix Representation – List Structures – Other Representation - Operations – Traversals - Breadth First Search   1. Depth first Search – Spanning Trees – Applications – Topological Sorting.   **Text Books**   * 1. Aaron M. Tenenbaum, Yeedidyah Langsam, Moshe J. Augenstein, “Data structures using C and C++”, Pearson Education.   2. Lipschutz: Schaum’s outline series Data structures Tata McGraw-Hill   **Reference Books**   1. Bandyopadhyay, Data Structures Using C Pearson Education, 1999 2. Introduction to Algorithms, TH Cormen, CE Leiserson, RL Rivest, C Stein, Third Ed, 2009, PHI 3. Data Structures - A Pseudocode Approach with C, Richard.F.Gilberg and Behrouz.A.Forouzan, Second Edition, Thomson Course Technology, 2007 4. Fundamentals of Data Structures, Ellis Horowitz and Sartaz Sahni |
| **Expected Course Outcomes:**  **CO1:** Recognize basic data structures such as arrays, linked lists, stacks and queues.  **CO2:** Identify different parameters to analyze the performance of an algorithm.  **CO3:** Apply Algorithms for solving problems like sorting, searching, insertion and deletion of data.  **CO4:** Outline appropriate data structure while designing the algorithms.  **CO5:** Compare the Trees, Graphs and its functionalities |

| **Course Code:** **BCACT 203 Course Title: L T P C**  **Object Oriented Programming With Java 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarize students with object-oriented programming language and software platform that runs on any kind of device, including notebook computers, mobile devices, gaming consoles, medical  devices, and many others. |
| **Unit 1: Introduction to Object Oriented Programming**  Introduction to Unit, Classes and Objects, Object Oriented Programming Concepts, Access Specifiers and Access Modifiers, Introduction to Java, Java Virtual Machine, Conclusion of the Unit  **Unit-2: Basic Java Programming**  Introduction to Unit, Variables, Data Types, Control flow statements – if, else, switch, for, while, Arrays, Strings, Conclusion of the Unit  **Unit 3: Java Packages and Interfaces**  Introduction to Unit, Java classes, Java methods, Packages, Interfaces, Java.util, java.io, java.net, java.sql, java.applet, Collection Framework, Generics, Wrapper classes, Conclusion of the Unit  **Unit-4: Exceptions and I/O Handling**  Introduction to Unit, Errors and Exceptions, Exception handling, Streams, Readers and Writers, Programming with Files, Multithreaded programming, Networking – Socket Programming, Conclusion of the Unit  **Unit-5 : User Interface and Advanced Concepts**  Introduction to Unit, User Interface Components, AWT, Swing, Event Handling, Layouts, Forms, Applets, Annotations, Conclusion of the Unit  **Text Books**  **1.** The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.  **Reference Books**  **1.** SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education. |
| **Expected Course Outcomes:**  **CO1:** Explain how Java provides support for principles of object oriented-programming and the Java Development Environment  **CO2:** Explain the Java basic constructs and control structures and Packages  **CO3:** Design and develop application for information storage and exchange using input/output and sockets.  **CO4:** Build applications that have an event-driven graphical user interface using the standard Java libraries. |

| **Course Code:** **BCACT 204 Course Title: L T P C**  **Database Management System 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model. 2. RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more. 3. The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.. |
| **Unit 1: Introduction**  Purpose of Database System -– Views of data – Data Models – Database Languages –– Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model ) – E-R Diagrams -- Introduction to relational databases  **Unit-2: Relational Model**  The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL  **Unit 3: SQL**  Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases  **Unit-4: Database Design**  Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form  **Unit-5 : Transactions**  Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.  **Text Books**   1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006. 2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.   **Reference Books**   1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006 2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007. 3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.. |
| **Expected Course Outcomes:**  **CO 1:** Understand the Purpose of Database System  **CO 2:**Understand the relational model  **CO 3:**Describe Integrity Constraints  **CO 4:**Describe SQL fundamentals  **CO 5:**Understand Functional Dependencies  **CO 6:**Describe the concepts of transaction  **CO 7:**Understand ACID properties |

| **Course Code:** **BCACT 205 Course Title: L T P C**  **Personality Development 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To enhance and sharpen the various skills related to Personality Development and also make students aware of how to make use of these skills more effectively in team building and resolving conflicts both in personal and professional life. |
| **Unit 1: Personality & Self Esteem**  Self-Management: discover yourself, skills and abilities, evaluate inner self, and expand your awareness, introspection, self- assessment, self-appraisal, self- development, self- interrogation, symptoms of negative attitude, anger management and positive attitude.  Definition of personality, Components of Personality, common personality types, Definition of Self Esteem, Factors related to self-esteem, SWOT analysis, Building Self Esteem, Definition of Attitude  **Unit-2: Interpersonal Skills & Working In team**  What are interpersonal skills? Importance of Interpersonal Skills in the Business world, How to build relationships, approaches to team building, difference between a team and a group, kinds of teams, What is a team, Significance of working in team, Qualities required to be an effective Team Member, Skills required to build an effective TEAM, practice activities for team building  Leadership Skills: Leadership traits and trends, leadership in business , dynamics between Leadership and management, Leadership styles in India, analysing leadership theories in the context of globalisation and leadership abroad, leaders for new organizations, different styles of Leadership  **Unit 3: Time Management & Planning**  Time as a resource, individual understanding of time, Effective time management Techniques, identifying time waster, achieving goals through effective time management, Time management Matrix – practice, multitasking, delegating, saying no assertively, relationship between time and stress management  Goal setting: concept of setting SMART goals, steps to achieve goals, career goals/ anticipating career challenges, utilizing opportunities, mapping skills sets.  **Unit-4: Problem Solving & Decision Making**  What is a problem? Different stages of resolving a problem, Different factors that influence decision making, Different stages of decision making  **Unit-5 : Conflict and stress Management**  What is a conflict?, Consequences of Conflict – Good & Bad, main sources of Conflict, Techniques to handle conflicts – Lose – win, Lose- Lose, Win – Lose, WIN- WIN; Role plays to practice conflict management, maintaining a positive attitude  Stress Management: stress and its causes, handling stress, types of stress, managing stress through motivation, relaxation techniques.  **Text Books**   1. How to win friends and influence people by Dale Carnegie, Ebury Publication, 2004 2. 7 habits of highly effective people by Stephen. R. Covey, Simon And Schuster, 2004 3. The Monk who Sold his Ferrari by Robin.S.Sharma, Jaico, 2003 |
| **Expected Course Outcomes:**  **CO1:** Students will develop knowledge and skills required to take up vendor certifications in the networking domain. |

| **Course Code:** **BCACT 206 Course Title: L T P C**  **Environmental Studies 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   * 1. To create awareness on the various environmental pollution aspects and issue.   2. To give a comprehensive insight into natural resources, ecosystem and biodiversity.   3. To educate the ways and means to protect the environment from various types of pollution.   4. To impart some fundamental knowledge on human welfare measures |
| **Unit 1: Introduction to Environmental Studies and Natural Resources**  Definition, scope and importance, Need for public awareness, Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer/pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam’s-benefits and problems. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.  **Unit-2: Basic Security Defense Mechanisms**  Concept of an ecosystem ,Structure and function of an ecosystem, Producers, consumers and decomposers Energy flow in the ecosystem ,Ecological succession ,Food chains, food webs and ecological pyramids Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Introduction to biodiversity – definition: genetic, species and ecosystem diversity Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values ,Biodiversity at global, national and local levels – India as a mega-diversity nation ,Hot-spots of biodiversity ,Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts,Conservation of biodiversity.  Leadership Skills: Leadership traits and trends, leadership in business , dynamics between Leadership and management, Leadership styles in India, analysing leadership theories in the context of globalisation and leadership abroad, leaders for new organizations, different styles of Leadership  **Unit 3: Environmental Pollution**  Definition, Causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear Hazards, Solid waste management: causes, effects and control measures of urban and industrial wastes,Role of an individual in prevention of pollution.  **Unit 4: Social Issues and the Environment**  From unsustainable to sustainable development,Urban problems related to energy ,Water conservation, rain water harvesting, watershed management ,Resettlement and rehabilitation of people; its problems and concerns, case studies ,Environmental ethics: issues and possible solutions ,Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents/holocaust, case studies ,Wasteland reclamation Consumerism and waste products.  **Unit 5: Human Population and the Environment**  Population growth, variation among nations, Population explosion- family welfare program, Environment and human health  **Text Books**   1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, PHI Learning education Pvt., Ltd., second edition, ISBN 81-297-0277-0, 2004. 2. Miller T.G. jr., “Environmental Science”, Wadsworth publishing co. 3. Townsend C., Harper J and Michael Begon, “Essentials of Ecology”, Blackwell science. 4. Trivedi R.K. and P.K. Goel, “Introduction to air pollution”, techno-science publications.   . |
| **Expected Course Outcomes:**  **CO 1:** The student will be able to, predict the scenario of various natural resources and suggest remedies to curb the exploitation of these resources.  **CO 2:** Identify food chain and web and its role in various ecosystems, assess the impacts on biodiversity and provide solutions to conserve it.  **CO 3:** Analyse the impacts of pollutants in the environment and propose suitable method to alleviate the pollutants and the natural disasters. Assess on the impact of human population and the health related issues and the ethics to be followed for sustainable life.. |

| **Course Code:** **BCACT 208 Course Title: L T P C**  **Data Structures and Algorithms Laboratory 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model. 2. RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more. . |
| **Lab Experiments:**   1. Write a program in C to count the frequency of each element of an array. 2. Write a program in C to count a total number of duplicate elements in an array. 3. Write a program in C to insert New value in the array (sorted list). 4. C Program to Reverse a Stack using Recursion. 5. C Program to Implement Two Stacks using a Single Array & Check for Overflow & Underflow. 6. C Program to Check String is Palindrome using Stack. 7. C Program to Identify whether the String is Palindrome or not using Stack. 8. C Program to Implement Queues using Stacks. 9. Write a program to implement a linked list and traverse the list. Print all the elements traversed. 10.Write a program to illustrate insertion in linked list as per following: 10. Insertion in the beginning. 11. insertion at the end 12. insertion in the intermediate position given by user.   11.Write a program to illustrate deletion in linked list as per following:   1. deletion in the beginning. 2. deletion at the end 3. deletion in the intermediate position given by user. 4. Write a program to reverse the linked list. 5. Write a program to sort the elements in linked list. 6. Write a program to illustrate insertion in circular linked list as per following: 7. Insertion in the beginning. 8. insertion at the end 9. insertion in the intermediate position given by user. 15.Write a program to implement binary tree. 16.Write a program to implement AVL tree.   17.Write a program to implement binary max heap.  18.Write a program to implement breadth first search using necessary data structure. 19.Write a program to find minimum spanning tree in graph using prims algorithm. 20.Write a program to find minimum spanning tree in graph using kruskals algorithm. |
| **Expected Course Outcomes:**  **CO 1:** Understand the Purpose of Database System  **CO 2** : Understand the relational model  **CO 3:** Describe Integrity Constraints  **CO 4:** Describe SQL fundamentals |

| **Course Code:** **BCACT 209 Course Title: L T P C**  **Object Oriented Programming With Java Laboratory 0 0 2 0** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarize students with object-oriented programming language and software platform that runs on any kind of device, including notebook computers, mobile devices, gaming consoles,  medical devices, and many others. |
| **Lab Experiments:**   1. A program to check whether two strings are equal or not. 2. Write a program to display reverse string. 3. Write aWrite program to find the sum of digits of a given number. 4. Write a program to display a multiplication table. 5. Write a program to display all prime numbers between 1 to 1000. 6. Write a program to insert element in existing array. 7. Write a program to sort existing array. 8. Write a program to create object for Tree Set and Stack and use all methods.   **Text Books**  **1.** The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.  **Reference Books**  **1.** SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education. |
| **Expected Course Outcomes:**  **CO1:** Explain how Java provides support for principles of object oriented-programming and the Java Development Environment  **CO2:** Explain the Java basic constructs and control structures and Packages  **CO3:** Design and develop application for information storage and exchange using input/output and sockets.  **CO4:** Build applications that have an event-driven graphical user interface using the standard Java libraries. |

| **Course Code:** **BCACT 210 Course Title: L T P C**  **Database Management System 0 0 2 0** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**  1. To familiarize students with object-oriented programming language and software platform that runs on any kind of device, including notebook computers, mobile devices, gaming consoles,  medical devices, and many others. |
| **Lab Experiments:**   1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepoint roleback command. 2. Create the following: 3. Synonym sequences and Index 4. Create alter and update views. 5. Create PL/SQL program using cursors, control structure, exception handling 6. Create following: 7. Simple Triggers 8. Package using procedures and functions. 9. Create the table for 10. COMPANY database 11. STUDENT database and Insert five records for each attribute. 12. Illustrate the use of SELECT statement 13. Conditional retrieval - WHERE clause 14. Query sorted - ORDER BY clause 15. Perform following: 16. UNION, INTERSECTION and MINUS operations on tables. 17. UPDATE, ALTER, DELETE, DROP operations on tables 18. Query multiple tables using JOIN operation. 19. Grouping the result of query - GROUP BY clause and HAVING clause 20. Query multiple tables using NATURAL and OUTER JOIN operation.   **Text Books**  **1.** The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.  **Reference Books**  **1.** SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education. |
| **Expected Course Outcomes:**  **CO1:** Explain how Java provides support for principles of object oriented-programming and the Java Development Environment  **CO2:** Explain the Java basic constructs and control structures and Packages  **CO3:** Design and develop application for information storage and exchange using input/output and sockets.  **CO4:** Build applications that have an event-driven graphical user interface using the standard Java libraries. |

## Semester-3

| **Course Code:** **BCACT-301 Course Title: L T P C**  **UNIX Shell Scripting 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. 2. This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications. 3. The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting. |
| **Unit 1: Introduction to UNIX:**  History of UNIX - Unix Components/Architecture - Features of Unix – UNIX Environment and UNIX Structure - Posix and Single Unix specification - The login prompt - UNIX commands – Basic commands - echo, printf, ls, who, date,passwd, cal - Combining commands - Internal and external commands – type, man , more and other commands - theuser terminal, displaying its characteristics and setting characteristics - The root login - super user: sucommand - /etc/passwd and /etc/shadow files - Commands to add, modify and delete users.  **Unit II: UNIX file system:**  UNIX File basics - File types and Categories – File Organization – Directories - home directory and the HOME variable - Reaching required files- the PATH variable - Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent parent directories - File related commands – cat, mv, rm, cp, wc - File inodes and the inode structure. File links – hard and soft links – Head and tail commands - Cut and paste commands - The sort command - Special files /dev/null and /dev/tty - File attributes and permissions - The umask and default file permissions - ls command - Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions  **Unit III: UNIX Process Management:**  The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.  **Unit IV: Vi Editor:**  Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg.  **Unit V: Shell programming:**  Introduction – Need for Scripts – Creating and Calling the Script – The Shebang – Different ways of running a script - Using variables in Script – Reading Input – Integer Variables – Arithmetic Expressions – Read-only variables – Exporting variables – Arrays - Control Statements: If, Then, Else, While and Until, Classic For, Break and Continue, Case – Handling Script Parameters: Shift, Getopts – Shell Functions – Handling Conditional expression patterns and Regular expressions in scripts.  **Text Books:**   1. Sumitabha Das., UNIX Concepts and Applications. 4th Edition. Tata McGraw Hill, July 2017. 2. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009   **Reference Books:**   1. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education. 2. Richard Blum, Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2 nd Edition , Wiley,2014 |
| **Expected Course Outcomes:**  Students can,   * To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification. |

| **Course Code:** **BCACT-302 Course Title: L T P C**  **Cloud Computing 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To provide students with the fundamentals and essentials of Cloud Computing. 2. To provide students a sound foundation of the Cloud computing so that they are able to identify the vendors and assess the risk involved in cloud migration. 3. To enable students be aware of the various governance issues in cloud and how to manage the same. |
| **UNIT – I : Fundamentals of Cloud Computing**  Cloud Computing Basics – History of Cloud Computing, Characteristics of Cloud Computing, Need for Cloud computing, Advantages and Possible Disadvantages of cloud computing, Cloud Deployment Models – Public, Private, Hybrid, Community, Other deployment Models. Evolving Data Center into Private Cloud, Datacenter Components, Extracting Business value in Cloud Computing – Cloud Security, Cloud Scalability, Time to Market, Distribution over the Internet, Cloud Computing Case Studies.  **UNIT – II: Cloud Delivery Models**  Introduction to Cloud Services, **Infrastructure as a Service (IaaS)** – Overview, Virtualization, Container, Pricing Models, Service Level Agreements, Migrating to the Cloud, IaaS Networking options, Virtual Private Cloud(VPC), IaaS Storage – File and Object storage, Data Protection, IaaS security, Benefits, Risks and Examples of IaaS. **Platform as a Service (PaaS)** – Overview, IaaSvsPaaS, PaaS Examples, benefits and risks. **Software as a Service (SaaS)** – Introducing SaaS, SaaS Examples – Office 365, Google G Suite, Salesforce.com , Evaluating SaaS – user and vendor perspective, Impact of SaaS, Benefits and risks of SaaS. **Other Services on Cloud**, **Cloud Delivery Models Considerations**  **UNIT – III :Cloud Platforms**  Introducing Cloud Platforms, Evaluating cloud platforms, Cloud Platform technologies – Amazon Web Services, Microsoft Azure, Google Cloud Platform, Salesforce.com, and Impact of Cloud platforms. Private Cloud Platforms – Introducing Private clouds – Microsoft Azure stack, Open stack, AWS Greengrass, Impact of Private clouds. **Cloud Migration** : Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies  **UNIT – IV: Cloud Computing - Challenges, Risk and Mitigation**  Cloud Storage, Application performance, Data Integration, Security. **Ensuring Successful Cloud Adoption**: Designing a Cloud Proof of Concept, Vendor roles and capabilities, moving to the Cloud. Impact of Cloud on IT Service Management. **Risks and Consequences of Cloud Computing** – Legal Issues, Compliance Issues, Privacy and Security.  **UNIT – V: Managing the Cloud**  Managing and Securing Cloud Services, Virtualization and the Cloud, Managing Desktops and devices on the cloud, SOA and Cloud computing, Managing the Cloud environment, Planning for the Cloud – Economic Cost Model and Leveraging the Cloud, Cloud computing resources, Cloud Dos and Don’ts.  **TEXTBOOKS:**   1. Kirk Hausman, Susan L. Cook, TelmoSampaio, “ CLOUD ESSENTIALS CompTIA® Authorized Courseware for Exam CLO-001”, John Wiley & Sons Inc., 2013 2. Judith Hurwitz ,‎ Robin Bloor ,‎ Marcia Kaufman ,‎ Fern Halper, “Cloud Computing for Dummies”, Wiley Publishing Inc., 2010   **REFERENCES:**   1. Erl,” Cloud Computing: Concepts, Technology & Architecture”, Pearson Education, 2014 2. Srinivasan, “Cloud Computing: A Practical Approach for Learning and Implementation   “Pearson Education, 2014 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1**:Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.  **CO2**: Analyze the risks involved in migrating the existing infrastructure to cloud.  **CO3**: Assess various cloud service providers and generate effective cloud infrastructure by optimizing the cost involved.  **CO4**: Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing. |

| **Course Code:** **BCACT-303 Course Title: L T P C**  **Information Security 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To help students understand foundational concepts of information security 2. To make it possible for students to appreciate the need for securing information from threats and risks 3. To facilitate students to gain knowledge on managing user identity & access and secure systems, servers and Internet. |
| **UNIT – I : Introduction**  Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The C I A of Security the Relation: Security functionality and Ease of Use Triangle  **UNIT – II:User Identity and Access Management**  User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Hashing and Cryptography- Encryption and Decryption  **UNIT – III: System and Server Security**  System Security, Desktop & Server Security, Firewalls, Password cracking Techniques, Key-logger, viruses and worms, Malwares & Spy wares, Windows Registry risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies  **UNIT – IV: Internet Security**  Internet Security: LAN Security, Email Security, Hacking attacks, preventive measures.  **UNIT – V: Risk Assessment and Cyber Laws**  Vulnerability Assessment, Penetration Testing**,** Risk Assessment, Threat, Vulnerability, Cyber Laws – Indian Context  **TEXTBOOKS:**   1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010 2. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009) 3. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012 4. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013) 5. Cyber Security by Nina Godbole, SunitBelapure, Wiley, 2011   **REFERENCES:**   1. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015) 2. Information Security Management Handbook, Volume 4 - Micki Krause, ISC2 Press, |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:**Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.  **CO2:** Analyze the risks involved in migrating the existing infrastructure to cloud.  **CO3:** Assess various cloud service providers and generate effective cloud infrastructure by optimizing the cost involved.  **CO4:** Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing. |
| **Course Code: BCACT-304 Course Title: L T P C**  **Storage and Datacenter 3 0 0 3** |
| **Prerequisites: None** |
| **Course Objectives:**   1. The explosion in demand from businesses for data to be highly available and access it in a secure manner. 2. Data Center Architecture and its requirements. 3. The storage systems and infrastructure architectures. 4. Planning and designing of Data center. 5. Introducing Server Farms, its types and features. |
| **UNIT – I: Introduction to Storage and Data Centers: Information Storage**  Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture - Managing Storage Infrastructure - Information Lifecycle Management - ILM Implementation and Benefits. **Data Centers Overview -** Data Center Goals and Facilities, Roles of Data Centers in the Enterprise and Service Provider Environment, Data Center Architecture – Data Center Requirements.  **UNIT – II: Storage System Environment**  Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host **RAID and Storage Networking Technologies :** Implementation of RAID - Software RAID - Hardware RAID -RAID Array Component -RAID Levels - Striping -Mirroring - RAID Impact on Disk-Performance - Introduction to Direct Attached Storage – Types of DAS – Introduction to SAN – Components of SAN – FC connectivity – FC topologies – Introduction to NAS – NAS components – NAS Implementation – NAS File sharing  **UNIT – III: Data Center Design**  Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wire ways, Cable Trays, Design and Plan against Vandalism, Data Center Design Case Studies, Modular Cabling Design, Points of Distribution, ISP Network Infrastructure, ISP WAN Links, Data Center Maintenance  **UNIT – IV : Introduction to Server Farms**  Types of server farms and data centre, internet server farm, intranet server farm, extranet server farm, internet data center, corporate data center, software defined data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services, IP Infrastructure Services, Application Services, Security Services, Storage Services.  **UNIT – V: Business Continuity and Disaster Recovery fundamentals**  Business continuance infrastructure services, the need for redundancy, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies.  **TEXTBOOKS:**   1. EMC Education Services, “Information Storage and Management: Storing, Managing, and Protecting Digital Information”, Wiley Publishing Inc., 1st edition, 2009. 2. Mauricio Arregoces, Maurizio Portolani, “Data Center Fundamentals”, Cisco Press, 2003.   **REFERENCES:**   1. Robert Spalding , “Storage Networks: The Complete Reference “, Tata McGraw Hill Publication, 2003 2. Kailash Jayaswal, “Administering Data Centers – Servers, Storage and Voice over IP”, Wiley Publishing Inc., 2006 |
| **Expected Course Outcomes:**  At the end of the course, students will be able to:  **CO1**: Recognize the storage devices  **CO2:** Explain data center architecture and its requirements  **CO3**: Illustrate the storage at network level  **CO4:** List and explain types of storage in infrastructure  **CO5:** Compare and contrast SAN NAS and CAS  **CO6:** Explain Server Farms and Services associated with it.  **CO7**: Explain business continuity and disaster recovery fundamentals. |

| **Course Code:** **BCACT-305 Course Title: L T P C**  **Server Administration 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To provide students with the fundamentals and essentials of Cloud Computing. 2. To provide students a sound foundation of the Cloud computing so that they are able to identify the vendors and assess the risk involved in cloud migration. 3. To enable students be aware of the various governance issues in cloud and how to manage the same. |
| **UNIT – I: Installing and Configuring Windows Server 2012**  Introduction, Selecting a Windows Server 2012 Edition, Supporting Server Roles and Features, Server Licensing, Installing Windows Server 2012: System Requirement, Performing a Clean Installation, Working with Installation Partitions, Server Core Defaults, Server Core Capabilities, Completing Post-Installation Tasks, Converting Between GUI and Server Core, Upgrade paths, Installing Windows Server Migration Tools, Configuring NIC Teaming, Configuring local storage, Configuring WDS to install OS through networking.  **UNIT – II: Securing Files and Disks.**  How to Securing Files, Encryption files with EFS, Configuring EFS, Using the Cipher Command, Sharing Files Protected with EFS with others, Configuring EFS with Group Policies, Configuring EFS Recovery Agent, Managing EFS Certificates, Encrypting Files with BitLocker, Configuring BitLocker Encryption, configuring BitLocker to Go, Configuring BitLocker Policies, Managing BitLocker Certificates.  **UNIT – III: Configuring File and Share Access Permissions**  Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting.  Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions, Installing File Server Resource Manager, Using, creating, changing Quotas, Managing Files with File Screening, Creating File Groups, Creating a File Screen, Creating a File Screen Exception, Creating a File screen Template. Storage Reports Management.  **UNIT – IV: Configuring DNS Zones and Records**  Understanding DNS, Understanding DNS Names and Zones, Understanding the Address Resolution Mechanism, configuring and Managing DNS Zones, Installing DNS, Configuring Primary and Secondary Zones, Configuring Active Directory-Integrated Zones, configuring Zone Delegation, configuring Stub Zones, configuring Caching-Only Servers, Configuring Forwarding and Conditional Forwarding, Configuring DNS Record types, creating and Configuring DNS Resource Records, Start of Authority(SOA) Records, Name Server(NS) Records, Host(A and AAAA) Records, Canonical Name(CNAME) Records, Pointer(PTR) Records.  **UNIT – V: Implementing Patch Management and Monitoring Server Performance**  Understanding windows Updates and Automatic Updates, Deploying Windows Server Update Services(WSUS), How to Install and Configure WSUS, Configuring WSUS Synchronization, Configuring WSUS Computer Groups, Configuring Group Policies for Updates, Configuring Client-Side Targeting, Approving Updates, Viewing Reports, Administrating WSUS with Commands, Troubleshooting Problems with Installing Updates. Introducing the Microsoft Management Console(MMC), Server Manager, Event Viewer, Understanding Logs and Events, Adding and Filtering Events, Managing Performance, Task Manager, Resource Monitor, Configuring Data Collector Sets (DCS), Monitoring the Network using Netstat and protocol analyzers.  **TEXTBOOKS:**   1. Windows Server 2012: A Handbook for Professionals by [Aditya Raj](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aditya+Raj&search-alias=stripbooks) (Author) 2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas   **REFERENCES:**   1. Administering Widows Server 2012 by Patrick Regan 2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, and Robert Butler. |
| **Expected Course Outcomes:**  At the end of the course, students will be able to:  **CO1:** Recognize the various services of Server 2012  **CO2:** Configuration of Active directory and manage the domains  **CO3:** Administrate and manage the AD domains in server 2012  **CO4:** Maintain and manage the group policies. |

| **Course Code:** **BCACT-306 Course Title: L T P C**  **Business Communication & Presentation Skills 3 0 0 3** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:** To train students in how to be effective communicators by practicing various skills and also help those in becoming well groomed individuals in terms of both verbal and non-verbal communication. |
| **UNIT – I: Principles of Effective written communication**  7 C’s of Business communication: Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, and Concreteness. Practice sessions for business writing.  **UNIT – II: Letter writing**  Structure & Planning, Types of Letter: Leave letter, Cover Letter, Application Letter.  Persuasive Writing: AIDA; practice sessions on letter writing.  **UNIT – III: Email & Memo writing**  Importance of Email & Memo writing in the business world, Format of Email & Memo, Structure of Email & Memo, practice sessions on email and memo writing  **UNIT – IV: Precise Writing & Report Writing**  Techniques of Precise writing, qualities of a good precise. Different types of Report – sales report, Annual report, Technical report, Components of a good report focusing on how to write short reports, practice sessions on report writing  **UNIT – V: Resume writing**  Components of a good resume, different formats of resume, resume writing practice  **Conducting Effective Meetings**  Different Types of meetings: Business meetings, Review meetings, Preparation for the meeting – Writing Agenda, MOM.  **Presentation Skills**  Planning & developing effective Presentation, Do’s & don’ts of a good presentation, use of Effective visual aids in a presentation  **TEXTBOOKS:**   1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill. 2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.   **REFERENCES:**   1. Shirley Taylor, Communication for Business, Pearson Education. 2. Lesiicar and Flatley, Basic Business Communication, Tata McGraw-Hill. 3. Courtan L. Bovee et al., Business Communication Today, Pearson Education. 4. Meenakshi Raman & Prakash Singh, Business communication, Oxford University Press |
| **Expected Course Outcomes:**  **CO1:** Students will be able to overcome nervousness and stage fear at the end of the course. |

| **Course Code:** **BCACT-307 Course Title: L T P C**  **Unix Shell Scripting Scripting 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. 2. This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications. 3. The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting. |
| **List of Experiments**   1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep,  dd, dfspace, du, ulimit. 2. Commands related to inode, I/O redirection and piping, process control commands, mails. 3. Shell Programming: Shell script exercises based on following: 4. Interactive shell scripts 5. Positional parameters 6. Arithmetic 7. if-then-fi, if-then- else-fi, nested if-else 8. Logical operators 9. else + if equals elif, case structure 10. while, until, for loops, use of break. 11. Write a shell script to create a file. Follow the instructions     1. Input a page profile to yourself, copy it into other existing file;     2. Start printing file at certain line     3. Print all the difference between two file, copy the two files.     4. Print lines matching certain word pattern. 12. Write shell script for-     1. Showing the count of users logged in,     2. Printing Column list of files in your home directory     3. Listing your job with below normal priority     4. Continue running your job after logging out. 13. Write a shell script to change data format. Show the time taken in execution of this script. 14. Write a shell script to print files names in a directory showing date of creation & serial  number of the file. 15. Write a shell script to count lines, words and characters in its input. 16. Write a shell script to print end of a Glossary file in reverse order using Array. 17. Write a shell script to check whether Ram logged in, Continue checking further after every  30 seconds till success. 18. Write a shell script to compute gcd lcm & of two numbers. Use the basic function to  find gcd & LCM of N numbers. 19. Write a shell script to find whether a given number is prime. Take a large number such  as 15 digits or higher and use a proper algorithm. 20. Write a shell script to reverse a given integer. 21. Write a shell script to list the files arranged in descending order of their size. 22. Write a shell script to check whether the given string is palindrome or not   **Text Books:**   1. Sumitabha Das., UNIX Concepts and Applications. 4th Edition. Tata McGraw Hill, July 2017. 2. Behrouz A. Forouzan, Richard F. Gilberg: UNIX and Shell Programming- Cengage Learning – India Edition. 2009   **Reference Books:**   1. M.G. Venkatesh Murthy: UNIX & Shell Programming, Pearson Education. 2. Richard Blum, Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2 nd Edition, Wiley,2014 |
| **Expected Course Outcomes:**  Students can,   * To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification. |

| **Course Code: BCACT-309 Course Title: L T P C**  **Storage and Datacenter 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. The explosion in demand from businesses for data to be highly available and access it in a secure manner. 2. Data Center Architecture and its requirements. 3. The storage systems and infrastructure architectures. 4. Planning and designing of Data center. 5. Introducing Server Farms, its types and features. |
| **List of Experiments**   1. Creating raw partitions and make a file system in server 2. Create volumes , extend and shrink the volumes 3. Configure RAID 1 (mirroring) that replicates the data in two different disks 4. Configure RAID 5 that shows the data striping with parity 5. Configure storage area network in server 2012 6. Configure iSCSI in server 2012 7. Configure and deploy NAS in server 2012 8. Create and use the virtual hard disk in Windows 7 9. Configuring the virtual disk to an existing virtual machine(VM) 10. Attaching different virtual disk formats in an existing VM with no downtime   **TEXTBOOKS:**   1. EMC Education Services, “Information Storage and Management: Storing, Managing, and Protecting Digital Information”, Wiley Publishing Inc., 1st edition, 2009. 2. Mauricio Arregoces, Maurizio Portolani, “Data Center Fundamentals”, Cisco Press, 2003.   **REFERENCES:**   1. Robert Spalding , “Storage Networks: The Complete Reference “, Tata McGraw Hill Publication, 2003 2. Kailash Jayaswal, “Administering Data Centers – Servers, Storage and Voice over IP”, Wiley Publishing Inc., 2006 |
| **Expected Course Outcomes:**  At the end of the course, students will be able to:  **CO1**: Recognize the storage devices  **CO2:** Explain data center architecture and its requirements  **CO3**: Illustrate the storage at network level  **CO4:** List and explain types of storage in infrastructure  **CO5:** Compare and contrast SAN NAS and CAS  **CO6:** Explain Server Farms and Services associated with it.  **CO7**: Explain business continuity and disaster recovery fundamentals. |

| **Course Code:** **BCACT-308 Course Title: L T P C**  **Server Administration 0 0 2 1** |
| --- |
| **Prerequisites:** None |
| **Course Objectives:**   1. To provide students with the fundamentals and essentials of Cloud Computing. 2. To provide students a sound foundation of the Cloud computing so that they are able to identify the vendors and assess the risk involved in cloud migration. 3. To enable students be aware of the various governance issues in cloud and how to manage the same. |
| **List of Experiments**   1. Installing and Configuring Windows Server 2012 Core Version and Converting from Core version to GUI. 2. Configuring Local storage using Disk management and Diskpart commands. 3. Installing and Configuring FSRM for Quota management and File Screening. 4. Configuring EFS and creating recovery agent. 5. Securing Disk and Drive using Bit Locker Drive Encryption 6. Installing and Configuring Primary DNS Server. 7. Installing and Configuring Secondary and Stub Zone for DNS Server 8. Installing and Configuring Windows Server Update Services [WSUS]. 9. Configuring Group Policies for Updates so that clients can target WSUS Server. 10. Creating and Configuring Data Collector Set.   **TEXTBOOKS:**   1. Windows Server 2012: A Handbook for Professionals by [Aditya Raj](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aditya+Raj&search-alias=stripbooks) (Author) 2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas   **REFERENCES:**   1. Administering Widows Server 2012 by Patrick Regan 2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, and Robert Butler. |
| **Expected Course Outcomes:**  At the end of the course, students will be able to:  **CO1:** Recognize the various services of Server 2012  **CO2:** Configuration of Active directory and manage the domains  **CO3:** Administrate and manage the AD domains in server 2012  **CO4:** Maintain and manage the group policies. |

## Semester-4

| **Course Code: BCACT-401 Course Title: L T P C**  **Software Engineering 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. Software engineering incorporates various accepted methodologies to design software. 2. This course gives a detailed description of the entire process of developing a software project and also the issues associated after development. 3. This course covers the introductory concepts of software engineering and its design, development and maintenance. |
| **UNIT – I: Software Product and Process**  Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.  **UNIT – II:Software Requirements**  Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.  **UNIT – III: Analysis, Design Concepts and Principles**  Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.  **UNIT – IV: Testing**  Taxonomy of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques.  **UNIT – V: Software Project Management**  Measures And Measurements – ZIPF’s Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools.  **TEXTBOOKS:**   1. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007.   **REFERENCES:**   1. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:**How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.  **CO2:**An ability to work in one or more significant application domains.  **CO3:**Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.  **CO4:**Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.  **CO5:**Demonstrate an ability to use the techniques and tools necessary for engineering practice. |

| **Course Code: BCACT-402 Course Title: L T P C**  **Server Side Scripting 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To learn the server side scripting languages and their applications. To understand complementarity of the class of languages to systems languages, their strengths and weaknesses. 2. To learn Frameworks and CMS. To get knowledge about server side scripting language python and ruby. Regular expressions, text processing, client- and server-level scripting and CGI, GUI programming using Python. 3. Basic concepts: scripts and scripting, scripting versus programming, scriptable objects and component ware, Ajax |
| **UNIT – I: Introduction to Server-side Scripting Languages**  Server-side Scripting, Different Scripting Languages, Web services, Web application frameworks – MVC, General purpose frameworks – e.g., Django, RoR; Discussion forums, Wikis, Weblogs, Content management system (CMS).  **UNIT – II: Introduction to Python**  How to set up the environment, Lexical conventions and Syntax, Variables, Data Types, Operators, Statements and Expressions, Decision making, Loops, Strings, Tuples, Lists, Dictionary, Recursion, Date and Time, Functions, Modules – math, random; Files I/O, Exceptions.  **UNIT – III: CGI and GUI Programming in Python**  Classes and Objects, Regular Expressions, CGI Programming, Database Access Networking, Sending Email, Multithreading, XML Processing, GUI Programming, Extending and Embedding Python.  **UNIT – IV: Introduction to Ruby on Rails**  MVC Architecture, How to install, Framework, Directory structure, Features, Basic Rails Application  **UNIT – V: Advanced Rails Applications**  Setting up the database, Active records, Migrations, Controllers, Routes, Views, Layouts, Scaffolding, AJAX, Uploading files, sending Email.  **TEXTBOOKS:**   1. Python: Essential Reference, by David M. Beazley 2. Core Python Programming, by Wesley J. Chun, Prentice Hall 3. Python Programming: An Introduction to Computer Science, by John M. Zelle, Franklin – Beedle and Associates   **REFERENCES:**   1. Professional Ruby on Rails by Noel Rappin, Wiley India Pvt Ltd 2. Learn Ruby on Rails: Book one, by Daniel Kehoe |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain basic Server web architecture  **CO2:**Understand working of web protocols like Python, Ruby Rails as well as IP and web address  **CO3:**Understand the CGI and GUI Programming.  **CO4:** Understand and use advance rails application |

| **Course Code: BCACT-403 Course Title: L T P C**  **Principles of Virtualization 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To understand the virtualization and Cloud Technology 2. Implementing Virtualization using Hypervisors 3. To understand the vSphere components and its features. 4. Understanding and implementing the Storage Virtualization 5. Implementing Network virtualization using VMware NSX 6. How to Secure the ESXi and vCenter Servers 7. Monitoring the performance of resources used in SDDC |
| **UNIT – I: Introduction**  Introduction to Virtualization - Types of virtualization - Difference between cloud and virtualization - Physical infrastructure and virtual infrastructure - Virtualization approaches - Partitioning - Hosting - Isolation - Hardware independence - Virtual machine - Hypervisor - Types of hypervisor - Virtual machine manager - Types of hypervisor - Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0.  **UNIT – II: Components of vSphere 6.0**  Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration MaximumsvCenter Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types.  **UNIT – III: Features of vSphere and NSX**  vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.  **UNIT – IV: VSphere Solutions to Data Center Challenges and vSphere Security**  Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances  **UNIT – V: Resource optimization and resource management**  Network Optimization - Configure and manage vSphere distributed switches - Migrate virtual machines from standard switches to distributed switches - Explain distributed switch features such as port mirroring - LACP - QoS tagging - and NetFlow - CPU Optimization - Explain the CPU scheduler operation - NUMA support - and other features that affect CPU performance - Monitor key CPU performance metrics - Memory Optimization - Explain ballooning - memory compression - and host swapping techniques for memory reclamation when memory is overcommitted - Monitor key memory performance metrics - Storage Optimization - Diagnose storage access problems - Configure VMware vSphere Flash Read Cache - Monitor key storage performance metrics  **TEXTBOOKS:**   1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications 2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012).   **REFERENCES:**   1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Installing and configuring the SDDC using VMware products.  **CO2:** Implementing Fault tolerance and High availability for the Virtual machines  **CO3:** Securing the Virtual environment.  **CO4:** Resource Optimization and monitoring. |

| **Course Code: BCACT-404 Course Title: L T P C**  **Ethical Hacking 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand how ethical hacking is used as a method to prevent hacking 2. To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable countermeasures 3. To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing |
| **UNIT – I: Introduction to Ethical Hacking:**  Hacking Methodology, Process of Malicious Hacking, and Foot printing and scanning: Foot printing, scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques  **UNIT – II: Hacking Methodology:**  Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques  **UNIT – III: Web and Network Hacking**  SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls.  **UNIT – IV: Report writing & Mitigation**  Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking  **UNIT – V: Ethical Hacking and Legal System**  Overview of India’s Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries  **TEXTBOOKS:**   1. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017) 2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016) 3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017) 4. An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August 2014) 5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016)   **REFERENCES:**   1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013) 2. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain the importance of ethical hacking in achieving the goals of information security  **CO2:** Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing  **CO3:** Comprehend the importance of appropriate countermeasures for managing vulnerabilities  **CO4:** Justify the need for meticulous documentation in writing reports for consumption of both technical and management audiences  **CO5:** Articulate the rationale for having an adequate legal framework for dealing with hacking and ethical hacking |

| **Course Code: BCACT-405 Course Title: L T P C**  **Network Security 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand various characteristics of network security, threats and risks to securing network 2. To make it possible for students to learn important network security protocols and means of achieving an effective network security 3. To facilitate students, gain hands-on experience of identifying and providing solutions for common network security challenges using various security tools and techniques |
| **UNIT – I: Introduction to Network Security**  Perimeter Security – Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Access Management, Multifactor Authentication, Wireless LAN (WLAN) Security and Network Admission Control (NAC)  **UNIT – II: Threats, Vulnerabilities and Attacks**  Threat; Vulnerabilities; Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network  **UNIT – III: Network Security Management**  Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN)  **UNIT – IV: Network Security Controls**  Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS high Availability; host Intrusion Prevention; Anomaly Detection and Mitigation.  **UNIT – V: Network Management**  Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies  **TEXTBOOKS:**   1. Network Security Bible by Eric Cole, Wiley; Second edition (2009) 2. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, Pearson Education; Second edition (15 September 2016) 3. Network Security and Administration by Adesh K. Pandey, S.K. Kataria& Sons; Reprint 2013 edition (2013) 4. Network Security: A Beginners Guide by Eric Maiwald, McGraw Hill Education; Third edition (1 November 2012) 5. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013) 6. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008.   **REFERENCES:**   1. Network Security. Principles And Practice. Fifth Edition. William Stallings. Prentice Hall. 2. Cryptography and Network Security Principles and Practices, Fourth Edition. By William Stallings. Publisher: Prentice Hall 3. Network Security Assessment: Know Your Network by Chris McNab, Shroff/O'Reilly; Third edition (1 December 2017) 4. Hacking Exposed 7: Network Security Secrets and Solutions by Stuart Mcclure, Joel Scambray, George Kurtz, McGraw Hill Education; 7 edition (16 March 2012) 5. Applied Network Security Monitoring: Collection, Detection, and Analysis by Chris Sanders, Jason Smith, Syngress (20 January 2014) 6. The Network Security Test Lab: A Step–by–Step Guide by Michael Gregg, John Wiley & Sons (9 October 2015). |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Relate fundamental concepts of information security with network and connectivity  **CO2:** Apply their understanding of network security in identifying common issues and propose suitable solutions  **CO3:** Articulate the importance of managing the network using policies, processes and framework for effective and efficient security |

| **Course Code: BCACT-406 Course Title: L T P C**  **Logical Reasoning and Thinking 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:** To help students learn the techniques of enhancing and sharpening their aptitude skills related to verbal ability, quantitative aptitude, logical reasoning and data presentation |
| **UNIT – I: Verbal ability**  Synonyms**,** Antonyms and One word substitutes  **UNIT – II: Basic quantitative aptitude**  Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.  **UNIT – III: Logical Reasoning - I**  Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data  **UNIT – IV: Measures of Central Tendency**  Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean  Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile  Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.  **UNIT – V: Presentation of Data**  Construction of tables with one or more factors of classification; Diagrammatic and  Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches  **TEXTBOOKS:**   1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007 2. Bajpai, N. Business Statistics, Pearson, 2010.   **REFERENCES:**   1. Sharma J.K., Business Statistics, Pearson Education India, 2010. 2. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, West Publishing Company, 1996. 3. CAT Complete course, UPKAR publications. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** By the end of this course, students will be able to use their logical reasoning and thinking skills more effectively; hence making them ready to clear written aptitude tests in industries and get placed easily. |

| **Course Code: BCACT-403 Course Title: L T P C**  **Principles of Virtualization 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To understand the virtualization and Cloud Technology 2. Implementing Virtualization using Hypervisors 3. To understand the vSphere components and its features. 4. Understanding and implementing the Storage Virtualization 5. Implementing Network virtualization using VMware NSX 6. How to Secure the ESXi and vCenter Servers 7. Monitoring the performance of resources used in SDDC |
| **Hardware:**  CPU: i3/i5  Network Card: 100Mbps/1Gbps  Memory: 8 GB  Storage: 256 GB/500GB  **Software Requirements:**  ESXi 5.5/6.0[Hypervisor]  vSphere Client  Google Chrome/ IE with Flash Player installed.  The infrastructure required to complete the lab exercises from Lab2 to Lab10 are as follows:  **Windows 7/8/10**  **Internet Speed: 2Mbps**  Web link for Online VMware Labs:  <http://labs.hol.vmware.com/HOL/catalogs/catalog/681>  Web link for HOL lab Manuals:  <http://docs.hol.vmware.com/>   | S.NO | Name of Lab Exercise | | | | --- | --- | --- | --- | | 1 | Installing and configuring ESXi 5.5/6.0 Server [On Premise] | | | | 2 | HOL-1810-01-SDC | Virtualization 101 | * Introduction to Management with vCenter Server * Introduction to vSphere Networking And Security | | 3 | HOL-1810-01-SDC | Virtualization 101 | Introduction to vSphere Storage | | 4 | HOL-1808-01-HCI - vSAN v6.6 - Getting Started | vSAN v6.6 - Getting Started | * vSAN 6.6 Setup and Enablement * vSAN Scale Out with Configuration Assist * vSAN All Flash Capabilities | | 5 | HOL-1808-01-HCI - vSAN v6.6 - Getting Started | vSAN v6.6 - Getting Started | * vSANiSCSI Target * vSAN Encryption | | 6 | HOL-1808-01-HCI - vSAN v6.6 - Getting Started | vSAN v6.6 - Getting Started | * vSANPowerCLI and ESXCLI * vSAN Stretched Cluster | | 7 | HOL-1803-01-NET - VMware NSX - Getting Started | VMware NSX | * NSX Manager Installation and Configuration * Logical Switching | | 8 | HOL-1803-01-NET - VMware NSX - Getting Started | VMware NSX | * Logical Routing * Edge Services Gateway | | 9 | HOL-1811-04-SDC - vSphere Security - Getting Started | vSphere Security | * Automating Password Complexity for ESXi Users * Forensic Security with vRealize Log Insight | | 10 | HOL-1811-04-SDC - vSphere Security - Getting Started | vSphere Security | * VM Encryption and Encrypted vMotion * Secure Boot for Hosts and VMs * No-Cryptography Administrator Roles and Permissions |   **TEXTBOOKS:**   1. Virtualization Essentials Paperback – 26 Apr 2012 by Matthew Portnoy - wiley publications 2. VMware Cookbook Paperback – 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012).   **REFERENCES:**   1. Mastering VMware vSphere 5.5 (SYBEX) Paperback – 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Installing and configuring the SDDC using VMware products.  **CO2:** Implementing Fault tolerance and High availability for the Virtual machines  **CO3:** Securing the Virtual environment.  **CO4:** Resource Optimization and monitoring. |

| **Course Code: BCACT-405 Course Title: L T P C**  **Network Security 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand various characteristics of network security, threats and risks to securing network 2. To make it possible for students to learn important network security protocols and means of achieving an effective network security 3. To facilitate students, gain hands-on experience of identifying and providing solutions for common network security challenges using various security tools and techniques |
| **Hardware:**  CPU: i3/i5  Network Card: 100Mbps/1Gbps  Memory: 8 GB  Storage: 256 GB/500GB  **Software Requirements:**  Cisco Packet Tracer, Wireshark, Windows 10, Ubuntu.  **Experiments:**   1. To configure a Host based and Gateway Firewall 2. VPN Configuration and Router Security configurations for a Network 3. IDS Configuration 4. Traffic Monitoring using Wire Shark 5. Accessing vulnerabilities in a Network by using various tools 6. Network security policies and standards 7. VLAN Configuration in Routers 8. Managing infrastructures in Wireless LANs 9. Defense in Depth & DMZ 10. Network Security for BYODs 11. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signature. 12. (a) Implementation of Diffiehellman key exchange algorithm.   (b) Implementation of MD5 hashing technique.  **TEXTBOOKS:**   1. Network Security Bible by Eric Cole, Wiley; Second edition (2009) 2. Network Security: Private Communication in a Public World by Charlie Kaufman, Radia Perlman, Mike Speciner, Pearson Education; Second edition (15 September 2016) 3. Network Security and Administration by Adesh K. Pandey, S.K. Kataria& Sons; Reprint 2013 edition (2013) 4. Network Security: A Beginners Guide by Eric Maiwald, McGraw Hill Education; Third edition (1 November 2012) 5. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013) 6. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008.   **REFERENCES:**   1. Network Security. Principles And Practice. Fifth Edition. William Stallings. Prentice Hall. 2. Cryptography and Network Security Principles and Practices, Fourth Edition. By William Stallings. Publisher: Prentice Hall 3. Network Security Assessment: Know Your Network by Chris McNab, Shroff/O'Reilly; Third edition (1 December 2017) 4. Hacking Exposed 7: Network Security Secrets and Solutions by Stuart Mcclure, Joel Scambray, George Kurtz, McGraw Hill Education; 7 edition (16 March 2012) 5. Applied Network Security Monitoring: Collection, Detection, and Analysis by Chris Sanders, Jason Smith, Syngress (20 January 2014) 6. The Network Security Test Lab: A Step–by–Step Guide by Michael Gregg, John Wiley & Sons (9 October 2015). |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Relate fundamental concepts of information security with network and connectivity  **CO2:** Apply their understanding of network security in identifying common issues and propose suitable solutions  **CO3:** Articulate the importance of managing the network using policies, processes and framework for effective and efficient security |

| **Course Code: BCACT-409 Course Title: L T P C**  **Ethical Hacking 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand how ethical hacking is used as a method to prevent hacking 2. To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable countermeasures 3. To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing |
| **Hardware:**   * I3/ I5 processor; 8GB RAM; 250GB HDD   **Software:**   * VM Player; Windows server; Windows 7/ 10; Kali Linux; All-in-one keylogger; DELmE virus maker.   **Experiments:**   1. Perform network scan to revile active hosts, open ports and services running 2. Perform privilege escalation attack on Client operating system and gain control of a Client operating system and write a short note on its mitigation strategy 3. Demonstrate ARP Poisoning and detect ARP Poisoning in switch-based network 4. Perform man-in-the-middle attack and hijack an established session of a user. Write a report on the same with mitigation strategy 5. Crack FTP credentials using dictionary attack and write a report of possible suggestion on hardening the login services 6. Perform user system surveillance and write a mitigation report on the same 7. Exploiting NetBIOS vulnerability and password revelation from browsers and social networking application using Key Logger and Trojan 8. Perform denial service attack on a server operating system and write a report on the same with mitigation strategy.   **TEXTBOOKS:**   1. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017) 2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016) 3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017) 4. An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August 2014) 5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016)   **REFERENCES:**   1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013) 2. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain the importance of ethical hacking in achieving the goals of information security  **CO2:** Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing  **CO3:** Comprehend the importance of appropriate countermeasures for managing vulnerabilities  **CO4:** Justify the need for meticulous documentation in writing reports for consumption of both technical and management audiences  **CO5:** Articulate the rationale for having an adequate legal framework for dealing with hacking and ethical hacking |

## Semester-5

| **Course Code: BCACT-501 Course Title: L T P C**  **Power Shell Scripting 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. It will introduce you to Windows PowerShell and provide an overview of the product’s functionality. 2. Basic understanding of the cmdlets available for system administration 3. Understanding pipeline feature in Windows PowerShell 4. Learning PSProviders, PSDrives adapters, Windows Management Instrumentation (WMI) and Common Information Model (CIM) 5. Introduces you to the Windows PowerShell remoting technology that enables you to connect to one or more remote computers and instruct them to run commands on your behalf |
| **UNIT – I: Introduction to Windows PowerShell**  Overview and background of Windows PowerShell, Understanding command syntax, Finding commands, Active Directory administration cmdlets, Network configuration cmdlets, Other server administration cmdlets.Understanding the pipeline, Selecting, sorting, and measuring objects, Filtering objects out of the pipeline, Enumerating objects in the pipeline, Sending pipeline data as output, Passing the pipeline data, Advanced considerations for pipeline data  **UNIT – II: PowerShell Adapters and Management Tools**  Using PSProviders, Using PSDrives **,**Creating files and folders on a remote computer, Creating a registry key for your future scripts, Create a new Active Directory group. Understanding WMI and CIM, Querying data by using WMI and CIM, Making changes with WMI/CIM, Querying information by using WMI, Querying information by using CIM, Invoking methods. Using variables, Manipulating variables, Manipulating arrays and hash tables, working with variable types, using arrays, Using hash tables  **UNIT – III: PowerShell scripting**  Introduction to scripting, Scripting constructs, Importing data from files, Setting a script, Processing an array with a ForEach loop, Processing items by using If statements, Creating a random password, Creating users based on a CSV file. Accepting user input, Overview of script documentation, Troubleshooting and error handling, Functions and modules, Querying disk information from remote computers, Updating the script to use alternate credentials, Documenting a script, Creating a logging function, Adding error handling to a script, Converting a function to a module  **UNIT – IV: Administering Remote Computers**  Using basic Windows PowerShell remoting, Using advanced Windows PowerShell, remoting techniques, Enabling remoting on the local computer, Performing one-to-one remoting,  Performing one-to-many remoting, Using PSSessions, Using implicit remoting, managing  Multiple computers.  **UNIT – V: Advanced Windows PowerShell techniques**  Using background jobs, Starting and managing jobs, Using scheduled jobs, creating a scheduled job. Creating profile scripts, Using advanced techniques, Practicing advanced techniques: Creating a profile script, Verifying the validity of an IP address, Reporting disk information, Configuring NTFS permissions, Creating user accounts with passwords from a CSV file, Practicing script development.  **TEXTBOOKS:**   1. Windows PowerShell Cookbook by leeholmes & dean Tsaltas, published by Shroff Publishers & distribution. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Configuring Windows PowerShell.  **CO2:** Running Windows PowerShell commands.  **CO3:** Identify and use cmdlets for other server administration tasks.  **CO4:** Describe the purpose of the Windows PowerShell pipeline.  **CO5:** Describe how to manipulate arrays and hash tables  **CO6:** Implement error handling for a script.  **CO7:** Use advanced remoting techniques. |

| **Course Code: BCACT-502 Course Title: L T P C**  **Database Security Fundamentals 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students relate concepts of information security with databases 2. To make it possible for students to learn how important principles of Security are implemented in securing the database |
| **UNIT – I: Concepts of Database Security Management System**  Database security concept, Importance of data, Levels of data security, Authorization in databases, Issues in database security, Concept of Least Privilege in User ID for databases. Perimeter security, firewalls, intrusion detection, and intrusion prevention  **UNIT – II: Concepts of NoSQL**  No SQL databases introduction, Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs’, Economics/Cost, Flexible Data models. Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability), BASE Properties, CAP theorem, comparison to traditional RDBMS databases. Horizontal scalability, Benefits of NoSQL Databases compared to traditional Databases.  Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multimodel Databases  **UNIT – III: Encryption and Permissions in SQL Server 2012**  Understanding permissions, Creating and using database roles, using schemas for security, configuring cross-database security. Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature  **UNIT – IV: Security of SQL Server 2012**  User authorization, authentication and security, protecting data using permissions, roles, schemas, SQL firewall, web application firewall, securing dynamic SQL from injections, protecting SQL server from DoS and injection attacks.  **UNIT – V: SQL Server Auditing**  Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing, auditing and tracing user configurable events, policy based management, system centre advisor to analyze instances\  **TEXTBOOKS:**   1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008 2. Database security by SilvanaCastano, 2nd Edition, Pub: Addison-Wesley Professional, 2008 3. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012.   **REFERENCES BOOKS:**   1. Handbook of database security: Applications and Trends Michael Gertz, SushilJajodia, Pub: Springer, 1st ed; 2008 2. Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain how security is ensured in database  **CO2:** Justify the need for securing database in mitigating important vulnerabilities |

| **Course Code: BCACT-503 Course Title: L T P C**  **Cloud Web Services 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. Introducing cloud computing and Amazon web services. 2. Understanding and using EC2 instances. 3. Deploying and managing applications on AWS cloud. 4. Using AWS security services. 5. Implementing the networking concepts on AWS cloud |
| **UNIT – I: Introduction to Cloud Computing and Amazon Web Services**  Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study  Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management and Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts  **UNIT – II: Introduction to EC2**  Introduction To EC2, Instance Types And Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Elastic IPS, Elastic Load Balancing  **UNIT – III: Web Applications and Security**  Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation, Introduction to CloudWatch, Describe Amazon Cloud Watch metrics and alarms, AWS Messaging Services(SNS,SQS,SES). Introduction to AWS Security, Describe Amazon Identity and Access Management (IAM), AWS Directory Service, AWS Key Management Service, Securing Data at Rest and In Motion,  **UNIT – IV: AWS Storage**  Amazon Storage, S3 Storage Basics, Buckets and Objects, Creating A Web Server Using S3 Endpoints, Managing Voluminous Information with EBS, Glacier Storage Service , Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance,  **UNIT – V: AWS Networking**  Introduction to AWS Networking , Access Control Lists (ACLs), Setting Up a Security Group, Setting Up VPC And Internet Gateway, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension Of Your Corporate Network), Route53 for DNS System, Cloud front, Case Study.  **TEXTBOOKS:**   1. [Joe Baron](https://www.amazon.in/Joe-Baron/e/B074H87YKC/ref=dp_byline_cont_ebooks_1), [HishamBaz](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_2?ie=UTF8&text=Hisham+Baz&search-alias=digital-text&field-author=Hisham+Baz&sort=relevancerank) , [Tim Bixler](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_3?ie=UTF8&text=Tim+Bixler&search-alias=digital-text&field-author=Tim+Bixler&sort=relevancerank) , [Biff Gaut](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_4?ie=UTF8&text=Biff+Gaut&search-alias=digital-text&field-author=Biff+Gaut&sort=relevancerank) , [Kevin E. Kelly](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_5?ie=UTF8&text=Kevin+E.+Kelly&search-alias=digital-text&field-author=Kevin+E.+Kelly&sort=relevancerank) , [Sean Senior](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_6?ie=UTF8&text=Sean+Senior&search-alias=digital-text&field-author=Sean+Senior&sort=relevancerank) , [John Stamper](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_7?ie=UTF8&text=John+Stamper&search-alias=digital-text&field-author=John+Stamper&sort=relevancerank) , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017.   **REFERENCES BOOKS:**   1. YohanWadia , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016 2. Bernald Golden, “Amazon Web Services for Dummies”, John Wiley & Sons, 2013 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** To gain fundamental understanding of AWS cloud technologies  **CO2:**Be able to start a Windows or Linux server in the cloud with its own private address  **CO3:** Be able to start up a CRM / Word Press / etc. website hosted in cloud  **CO4:** Be able to start a highly scalable MySQL or Oracle database in the cloud with multiple read-replica databases (for scalability of database)  **CO5:** Be able to setup a load-balancer in the cloud. |

| **Course Code: BCACT-504 Course Title: L T P C**  **Cloud Security 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students relate concepts of information security with Cloud computing 2. To make it possible for students to learn how important principles of Security are implemented in virtualization and Cloud platforms in managing issues and challenges 3. To facilitate students to understand how security principles are useful in establishing privacy and trust in Cloud. |
| **UNIT – I: Introduction to Virtualization & Cloud**  Virtualization and Cloud computing concepts – private vs public cloud, IaaS, PaaS&SaaS concepts, Virtualization security concerns – hypervisor and host/ platform Security, Security communications between – guest instances, hosts and guests, security challenges and mitigation measures  **UNIT – II: Cloud Security**  Cloud Security vulnerabilities and mitigating controls, top threats to Cloud security, mitigation through Cloud Controls Matrix  **UNIT – III: Cloud Trust Protocol & Transparency**  Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Privacy & Compliance aspects of Cloud, CloudTrust 2.0, Security Content Automation Protocol, Case Study on building transparent cloud  **UNIT – IV: Cloud Data Security**  Lifecycle, storage architecture security, foundational principles and strategies, data masking, secure migration and traceability technologies, encryption for data at rest and data in transit, platform and software specific Cloud Security aspects.  **UNIT – V: Legal aspects impacting Cloud Security and Privacy**  Understanding legal challenges involved in Cloud, liability, copyright, data protection, IPR, data portability, inter-country legal frameworks, personal data protection and privacy, data controller and processor, contracts, provider’s insolvency risk.  **TEXTBOOKS:**   1. Virtualization Security: Protecting Virtualized Environments by Dave Shackleford, Sybex (4 December 2012) 2. OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015) 3. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines, Wiley, 2010 4. Cloud Security and Privacy by Mather Tim, Shroff Publishers & Distributers Private Limited - Mumbai; First edition (2009)   **REFERENCES BOOKS:**   1. Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress (1 June 2011) 2. Practical Cloud Security: A Cross-Industry View by Melvin B. Greer Jr., Kevin L. Jackson CRC Press; 1 edition (2 August 2016) 3. CCSP (ISC)2 Certified Cloud Security Professional Official Study Guide 1st , Kindle Edition by Ben Malisow (Author) 4. www.cloudsecurityalliance.org |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:**explain how security is implemented in virtualization and cloud computing  **CO2:** articulate the importance of security principles in achieving trust and privacy in Cloud  **CO3:** rationalize the need for understanding legal aspects of security and privacy in Cloud computing |

| **Course Code: BCACT-505 Course Title: L T P C**  **Digital Forensics and Investigation 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand how computer forensics is used as a powerful technique in digital investigation. 2. To make it possible for students to learn the process, various steps, tools and techniques involved in computer forensics 3. To facilitate students, appreciate the need for understanding legal aspects of computer forensic investigation and need for meticulous documentation |
| **UNIT – I**  **Computer Forensics**  Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure, Case Studies  **UNIT – II:**  **Storage Devices & Data Recover Methods**  Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium, Working of Storage devices-Platter, Head assembly, spindle motor, Data Acquisition, Data deletion and data recovery method and techniques, volatile data analysis, Case Studies.  **UNIT – III**  **Forensics Techniques**  Windows forensic, Linux Forensics, Network forensics – sources of network-based evidence, other basic technical fundamentals, Mobile Forensics – data extraction & analysis, Steganography, Password cracking-Brute force, Cross-drive analysis, Live analysis, deleted files, stochastic forensics, Dictionary attack, Rainbow attack, Email Tacking – Header option of SMTP, POP3, IMAP, examining browsers, Case Studies  **UNIT – IV**  **Cyber Law**  Corporate espionage, digital evidences handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment), Case Studies, Incident specific procedures – virus and worm incidents, Hacker incidents, Social incidents, physical incident, Guidelines for writing forensic report  **UNIT – V**  **Forensic Analysis of Web Application**  Forensic analysis of web server, network analysis of web server compromise, web server log analysis, web application forensic, forensic analysis of web application security, intruder profiling, forensic for code injection attack, Case Studies  **TEXTBOOKS:**   1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st; 2015 2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016 3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nded; 2014 4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing - an imprint of LexisNexis; First 2017 edition 5. Network Forensics:Tracking Hackers Throu by Davidoff, Pearson India, 1st ed; 2013 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain the importance of computer forensic in achieving the goals of information security.  **CO2:** Comprehend steps involved in recovering data stored in various devices and various techniques. Used in windows, linux, network and web application forensics.  **CO3:** Justify the need for meticulous documentation in computer forensics.  **CO4:** Articulate the rationale for having an adequate legal framework when dealing with computer forensics. |

| **Course Code: BCACT-506 Course Title: L T P C**  **Working Towards Placements 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:** To give students more practice sessions on the essentials of getting placed in good companies by sharpening their skills in terms of GD, Interview, Resume writing and Aptitude (Logical thinking and Reasoning). |
| **UNIT – I**  **Group Discussion**  What is a GD? Types of GD, Essentials of a GD, Skills assessed during GD, GD practice session (at least twice), and Doubt clearing and practice sessions on GD, structure of a GD, format of GD as used in national level recruitment boards, differences between a GD and a debate.  **UNIT – II:**  **Resume writing**  Resume format, Current trends in resume writing, how to write professional resumes, Essentials of resume writing, cover letters, working on Resumes and being in sync with the current format, difference between a CV and a Resume  **UNIT – III**  **Interview handling skills**  Types of interview ( one to one, many to one, telephonic, appraisal, placement, discipline, exit) Interview handling skills, effective way of handling interview questions, Mock interview practice sessions (at least twice), Doubt clearing and practice sessions on Interview skills, grooming, kinesics, paralanguage and proxemics in interviews, frequently asked questions during interviews.  **UNIT – IV**  **Presentation Skills**  Presentation Skills, practicing how to be professional and formal in approach, formal language to be used during presentation, body language and grooming, Practising impromptu presentations, extempore and debates, types of presentation, effective strategies of oral presentations, audience analysis, use of media, voice modulation, presentation planning, delivery and appearance, research, power point presentations, making technical talk interesting.  **UNIT – V**  **Verbal Reasoning & Quantitative aptitude - Revisit**  Synonyms**,** AntonymsandOne word substitutes  Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some  Government publications.  **TEXTBOOKS:**   1. Group Discussions and Interviews- Anand Ganguly, Paperback, 2015 2. Mastering Interviews and GDs- Mathur D, Paperback, 2012.   **REFERENCE BOOKS**:   1. IT interview questions: A primer for the IT job interviews- Narasimha Karumanchi, Career Monk Publications, 2015 2. No Mistakes Resumes: Giacomo Giammatteo, inferno publishing company, 2014 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** To give students more practice sessions on the essentials of getting placed in good companies by sharpening their skills in terms of GD, Interview, Resume writing and Aptitude (Logical thinking and Reasoning). |

| **Course Code: BCACT-507 Course Title: L T P C**  **Power Shell Scripting 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. It will introduce you to Windows PowerShell and provide an overview of the product’s functionality. 2. Basic understanding of the cmdlets available for system administration 3. Understanding pipeline feature in Windows PowerShell 4. Learning PSProviders, PSDrives adapters, Windows Management Instrumentation (WMI) and Common Information Model (CIM) 5. Introduces you to the Windows PowerShell remoting technology that enables you to connect to one or more remote computers and instruct them to run commands on your behalf |
| **List of Experiments**  **Module 1: Introduction to Windows PowerShell**  **Lab 1 : Configuring Windows PowerShell and working with basic commands**   * Configuring the Windows PowerShell console * Configuring the Windows PowerShell ISE application * Finding commands * Running commands * Using the About files   **Lab 2 : Windows Administration and working with Objects**   * Creating and managing Active Directory objects * Configuring network settings on Windows Server * Creating a web site * Selecting, sorting, and displaying data * Filtering objects * Enumerating objects   **Lab 3 : Working with file and pipeline parameter binding**   * Exporting user information to a file * Send output consisting of pipeline data. * Predicting pipeline behaviour   **Module 2: PowerShell Adapters and Management Tools**    **Lab 4 : Using PSProviders and PSDrives**   * Creating files and folders on a remote computer * Creating a registry key for your future scripts * Create a new Active Directory group   **Lab 5: Working with WMI and CIM**   * Querying data by using WMI and CIM * Making changes with WMI/CIM * Querying information by using WMI * Querying information by using CIM * Invoking methods   **Lab 6: Working with variables**   * Working with variable types * Using arrays * Using hash tables   **Module 3: Power Shell scripting**    **Lab 7 : Basic scripting**   * Setting a script * Processing an array with a ForEach loop * Processing items by using If statements * Creating a random password * Creating users based on a CSV file   **Lab 8 : Accepting data from users**   * Querying disk information from remote computers * Updating the script to use alternate credentials * Documenting a script   **Lab 9 : Implementing functions and modules**   * Creating a logging function * Adding error handling to a script * Converting a function to a module   **Module 4: Administering Remote Computers**    **Lab 10: Using basic remoting and PS Sessions**   * Enabling remoting on the local computer * Performing one-to-one remoting * Performing one-to-many remoting * Using implicit remoting * Managing multiple computers   **Module 5:  Advanced Windows PowerShell techniques**    **Lab 11 : Using background jobs and scheduled jobs**   * Starting and managing jobs * Creating a scheduled job   **Lab 12: Practicing advanced techniques**   * Creating a profile script * Verifying the validity of an IP address * Reporting disk information * Configuring NTFS permissions * Creating user accounts with passwords from a CSV file   **TEXTBOOKS:**   1. Windows PowerShell Cookbook by leeholmes & dean Tsaltas, published by Shroff Publishers & distribution. |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Configuring Windows PowerShell.  **CO2:** Running Windows PowerShell commands.  **CO3:** Identify and use cmdlets for other server administration tasks.  **CO4:** Describe the purpose of the Windows PowerShell pipeline.  **CO5:** Describe how to manipulate arrays and hash tables  **CO6:** Implement error handling for a script.  **CO7:** Use advanced remoting techniques. |

| **Course Code: BCACT-508 Course Title: L T P C**  **Cloud Web Services 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. Introducing cloud computing and Amazon web services. 2. Understanding and using EC2 instances. 3. Deploying and managing applications on AWS cloud. 4. Using AWS security services. 5. Implementing the networking concepts on AWS cloud |
| 1. Introduction to Amazon Simple Storage Service (S3) 2. Introduction to Amazon Cloud Front 3. Introduction to AWS Key Management Service 4. Introduction to Amazon Elastic search Service 5. Introduction to Amazon Dynamo DB 6. Introduction to Amazon API Gateway 7. Introduction to Amazon Redshift 8. Introduction to Amazon Aurora 9. Introduction to Amazon Machine Learning 10. Introduction to AWS Database Migration Service 11. Introduction to AWS Lambda 12. Introduction to AWS Internet-of-Things (IoT) 13. Introduction to AWS Device Farm 14. Introduction to Amazon Kinesis Firehose 15. Introduction to Amazon Route 53 16. Introduction to Amazon Elastic File System (EFS)   **TEXTBOOKS:**   1. [Joe Baron](https://www.amazon.in/Joe-Baron/e/B074H87YKC/ref=dp_byline_cont_ebooks_1), [HishamBaz](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_2?ie=UTF8&text=Hisham+Baz&search-alias=digital-text&field-author=Hisham+Baz&sort=relevancerank) , [Tim Bixler](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_3?ie=UTF8&text=Tim+Bixler&search-alias=digital-text&field-author=Tim+Bixler&sort=relevancerank) , [Biff Gaut](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_4?ie=UTF8&text=Biff+Gaut&search-alias=digital-text&field-author=Biff+Gaut&sort=relevancerank) , [Kevin E. Kelly](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_5?ie=UTF8&text=Kevin+E.+Kelly&search-alias=digital-text&field-author=Kevin+E.+Kelly&sort=relevancerank) , [Sean Senior](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_6?ie=UTF8&text=Sean+Senior&search-alias=digital-text&field-author=Sean+Senior&sort=relevancerank) , [John Stamper](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_7?ie=UTF8&text=John+Stamper&search-alias=digital-text&field-author=John+Stamper&sort=relevancerank) , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017.   **REFERENCES BOOKS:**   1. YohanWadia , “AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016 2. Bernald Golden, “Amazon Web Services for Dummies”, John Wiley & Sons, 2013 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** To gain fundamental understanding of AWS cloud technologies  **CO2:**Be able to start a Windows or Linux server in the cloud with its own private address  **CO3:** Be able to start up a CRM / Word Press / etc. website hosted in cloud  **CO4:** Be able to start a highly scalable MySQL or Oracle database in the cloud with multiple read-replica databases (for scalability of database)  **CO5:** Be able to setup a load-balancer in the cloud. |
| **Course Code: BCACT-509 Course Title: L T P C**  **Summer Project Seminar 0 0 2 1** |
| **Prerequisites: None** |
| As per university Guidelines |

| **Course Code: BCACT-507 Course Title: L T P C**  **Digital Forensics and Investigation 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand how computer forensics is used as a powerful technique in digital investigation 2. To make it possible for students to learn the process, various steps, tools and techniques involved in computer forensics 3. To facilitate students, appreciate the need for understanding legal aspects of computer forensic investigation and need for meticulous documentation |
| **List of Experiments:**  Hardware:   * I3/ I5 processor; 8GB RAM; 250GB HDD   Software:   * VM Player; Windows server; Linux server; Sys Internals; Helix ISO; Disk Internals; FTK; OpenStego; Xplico; BulkExtractor   Experiments:   1. System Forensics – System is switched on and off and imaging – To take an exact copy of evidence disk 2. Web browserand Internet forensics 3. Image steganography &Steganalysisand recovering deleted files 4. E- Mail investigation &analysis 5. Data carving 6. Linux server forensic 7. Windows server forensics 8. Log collection from network devices   **TEXTBOOKS:**   1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st; 2015 2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016 3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nded; 2014 4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing - an imprint of LexisNexis; First 2017 edition 5. Network Forensics:Tracking Hackers Throu by Davidoff, Pearson India, 1st ed; 2013 |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain the importance of computer forensic in achieving the goals of information security.  **CO2:** Comprehend steps involved in recovering data stored in various devices and various techniques.Used in windows, linux, network and web application forensics.  **CO3:** Justify the need for meticulous documentation in computer forensics.  **CO4:** Articulate the rationale for having an adequate legal framework when dealing with computer forensics. |

## Semester-6

| **Course Code: BCACT-601 Course Title: L T P C**  **Infrastructure Solutions on Cloud 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and service through a global network of Microsoft-managed data centers. 2. Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet. 3. This course is designed to introduce the concepts of Cloud Computing as a new computing paradigm. The students will have an opportunity to explore the Cloud Computing various terminology, principles and applications. 4. The course will expose students to different views of understanding the Cloud Computing such as theoretical, technical and commercial aspects. 5. A variety of real case studies and existing in market cloud- based tools will be identified and studied in order to provide students with a close overview to Cloud Computing applications. |
| **UNIT – I: Getting Started with Azure**  Overview of Cloud Computing – Various Cloud Offerings – Azure Basics – Azure Services – Azure Portals – Preview Portal, Management Portal, Subscription Management – Billing – Pricing Calculator - Azure Virtual Machines : Virtual Machine(VM) Basics – Status, IP Address, Creating and Configuring Virtual Machines – Configuring VM disks – Virtual Machine Management  **UNIT – II: Azure Storage**  Storage Basics – Storage Types – Azure Storage Offerings – Understanding Azure Regions – Using Storage Accounts – Enabling Larger and Faster Storage – Resizing Azure Disks – Using Premium Storage – Monitoring Azure Storage Accounts – Best Practices for Azure Storage – Azure VM Storage Types – Azure Files – Managing Azure Storage.  **UNIT – III:Azure Networking**  Basics of Virtual Networks –Address Spaces, Subnets, DNS Servers – Creating and Using Virtual Networks – Network Security Groups – Virtual Appliances – Load Balancer basics – Configuring Load Balancers – Creating and Using Load balancers – Azure VPN.  **UNIT IV: Azure Active Directory**  Introduction to Active Directory(AD), Identity and Authentication in Public Cloud – Introduction to Azure AD – Extending Active Directory into Azure – Azure AD and applications – Reporting and Monitoring Azure AD.  **UNIT – V: Azure Databases**  SQL Azure: Creating a SQL Server - Creating a SQL DB - Creating Tables - Adding Data to the Table - View Connection Strings - Security Configurations - Migrating on premise DB to SQL Azure.  Azure Websites: Creating a Website, Setting deployment credentials -Choosing a platform -Setting up Default page for website - Scaling - Auto Scaling by Time -Auto Scaling by Metric - Difference between Free, Shared, Basic and Standard websites - Creating a website using Visual studio  **TEXTBOOKS:**   1. Michael Collier, Robin Shahan, “Fundamentals of Azure – Microsoft Azure Essentials”, Microsoft Press, 2015.   **REFERENCE BOOKS:**   1. Michael W, “Implementing Microsoft Azure Infrastructure Solutions”, Phi Learning Pvt Ltd, 2009. |
| **Expected Course Outcomes:**  Students will be able to  **CO1:** Students will learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.  **CO2:** Introduce the broad perceptive of cloud architecture and model.  **CO3:** Apply different cloud programming model as per need.  **CO4:** Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications. |

| **Course Code: BCACT-602 Course Title: L T P C**  **IT Governance & Risk Management 3 0 0 3** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. To help students understand the need for governance in information security 2. To make it possible for students to learn how important concepts of IT governance is integrated with information security 3. To facilitate students to learn key frameworks used in information security and risk management and need for a metrics-based approach for effective information security |
| **UNIT – I: IT Governance-Part 1**  Introduction & Concepts, Origin of Governance, Corporate Governance, Best Practices for IT Governance, Role of Governance in Information Security, Six outcomes of effective Security Governance, benefits of good governance, Cultural aspects in governance.  **UNIT – II:IT Governance-Part 2**  IT Governance-Roles and Responsibilities, Role of IT Strategy Committee and Security Steering Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA, Governance in multi-department and multi-country enterprises, Importance of Governance in establishing a sustainable Security Culture in the organization.  **UNIT – III: Information Systems Strategy**  Role of Strategic Planning for IT, Strategic Direction and Alignment of Security Strategy with Business Objectives, Role of CISO, Security Metrics Program.  **UNIT – IV: Risk Management Program**  Develop a Risk Management Program. Risk Management Process, Roles and Responsibilities, Risk-IT Framework of ISACA, Strategic Security decisioning using Risk Management  **UNIT – V: Information Security Management**  Introduction, Performance Optimization, Management Information Security Forum, Segregation of Duties, Description of COBIT and other Frameworks, Security Program Effectiveness, Continuous Assessment and Improvement, In-sourcing versus Out-sourcing, Impact of ISM program across organization  **TEXTBOOKS:**   1. Information Security Governance by S.H. Solms, RossouwSolms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December 2008) 2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by Weill, Harvard Business Review Press; First edition (1 June 2004) 3. ISACA publications   **REFERENCE BOOKS:**   1. Calder, Steve Watkins, Kogan Page; 6 edition (3 September 2015) 2. ISACA publications on COBIT, RiskIT and ValIT 3. Information Security Governance: Guidance for Information Security Managers by W. KragBrotby and IT Governance Institute, Isaca (2 June 2008) 4. COBIT 5 Framework Perfect by Isaca, (10 April 2012) 5. Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June 2016) 6. Governance of Enterprise IT Based on COBIT 5: A Management Guide by Geoff Harmer (Author), IT Governance Publishing, (6 February 2014) |
| **Expected Course Outcomes:**  After completion of the course the student will be able:  **CO1:** Explain how security is integrated with IT governance  **CO2:** Justify the need for using standard frameworks in establishing a robust information security and risk management |

| **Course Code: BCACT-603 Course Title: L T P C**  **Infrastructure Solutions on Cloud 0 0 2 1** |
| --- |
| **Prerequisites: None** |
| **Course Objectives:**   1. Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and service through a global network of Microsoft-managed data centers. 2. Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet. 3. This course is designed to introduce the concepts of Cloud Computing as a new computing paradigm. The students will have an opportunity to explore the Cloud Computing various terminology, principles and applications. 4. The course will expose students to different views of understanding the Cloud Computing such as theoretical, technical and commercial aspects. 5. A variety of real case studies and existing in market cloud- based tools will be identified and studied in order to provide students with a close overview to Cloud Computing applications. |
| **List of Experiments:**   1. Create and document the process of creating a windows azure account 2. Create a virtual machine from available releases of windows server images 3. Create a virtual machine using the option “quick Create” 4. Create a custom VM and Capture the image 5. Create a vm from a captured image 6. Add a VMs to a cluster and deploy load balancer on the same 7. Create and publish / host a webpage in windows azure 8. Create a website using Visual studio 9. Create a SQL server DB , Create tables and add data to the table 10. Test basic sql commands on the table created in the previous step. 11. Migrate an on premise DB to Azure   Create a storage account in Azure  **TEXTBOOKS:**   1. Michael Collier, Robin Shahan, “Fundamentals of Azure – Microsoft Azure Essentials”, Microsoft Press, 2015.   **REFERENCE BOOKS:**   1. Michael W, “Implementing Microsoft Azure Infrastructure Solutions”, Phi Learning Pvt Ltd, 2009. |
| **Expected Course Outcomes:**  Students will be able to  **CO1:** Students will learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.  **CO2:** Introduce the broad perceptive of cloud architecture and model.  **CO3:** Apply different cloud programming model as per need.  **CO4:** Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications. |

| **Course Code: BCACT-604 Course Title: L T P C**  **Major Project /Internship 0 0 20 10** |
| --- |
| **Prerequisites: None** |
| As per the University Guidelines |