BCA(System Administration and Cyber Security)

Semester-V

L-3 T-1 P-0 C-4

25SACS170T: Cyber Security Techniques and Tools

Course Objectives:
- To grasp basic cyber security principles, concepts, and methodologies.
- To discover tools for threat detection, analysis, and prevention.
- To implement techniques to identify vulnerabilities, mitigate risks, and counter cyber threats.
- To gain practical skills through hands-on exercises with cyber security tools.
- To cultivate critical thinking to analyze incidents, devise response strategies, and adapt to evolving threats.

Course Outcomes:
Student will be able to :

1. Understand cyber security techniques and tools for threat detection, analysis, and prevention.
2. Apply techniques and tools to identify vulnerabilities, mitigate risks, and counter cyber threats.
3. Analyze incidents and evaluate the effectiveness of measures in mitigating threats.
4. Develop practical skills through hands-on exercises with cyber security tools.
5. Cultivate critical thinking to assess threats, devise response strategies, and adapt to cyber security challenges.

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

UNIT-I: – CYBER ISSUES   12 Hours
Window Password Hacking and Cracking – Steganography - Data frauds - data diddling - scavenging - data theft - data leakage – squatting - Id theft - Password theft – key, logger - Job Racketing - Marketing and Advertising Rackets - Nigerian frauds- pay per click scams – web defacement - ATM frauds - IP spoofing - email & ip address – Software piracy - software license - commercial piracy.

UNIT-II: VIRTUAL LAB SETUP   12 Hours
Installing VMware -Setting Up Kali Linux - Target Virtual Machines - Creating the Windows XP Target - Setting Up the Ubuntu 8.10 Target - Creating the Windows 7 Target.

UNIT-III: KALI LINUX   12 Hours

Linux Command Line - The Linux Filesystem - User Privileges - File Permissions - Editing Files- Data Manipulation - Managing Installed Packages - Processes and Services - Managing Networking - Netcat: The Swiss Army Knife of TCP/IP Connections - Automating Tasks. Practical Component: Implementation of Windows security using firewall and other tools Suggested Readings: The Linux Filesystem, Netcat

UNIT-IV: METASPLOIT FRAMEWORK   12 Hours

Starting Metasploit - Finding Metasploit Modules - Setting Module Options - Payloads - Types of Shells - Setting a Payload Manually - Msfcli - Creating Standalone Payloads with Msfvenom - Using an Auxiliary Module. Practical Component: Implementation to identify web vulnerabilities Suggested Readings: Metasploit, Msfcli

UNIT-V: MOBILE HACKING   12 Hours

Mobile Attack Vectors - The Smartphone Pentest Framework - Remote Attacks - ClientSide Attacks - Malicious Apps - Mobile Post Exploitation

Total 60 Hours

Reference books:

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies (2015), Security in Computing, 5th Edition , Pearson Education .
2. Gautam Kumawat(2017), Ethical Hacking & Cyber Security Course: A Complete Package, Udemy Course (First Unit)
3. Georgia Weidman(2014) , Penetration testing A Hands- On Introduction to Hacking, no starch press II-V unit)

List of e-Learning Resources:

1.https://www.cisco.com/c/en_in/products/security/what-is-cybersecurity.html

2.https://www.techtarget.com/searchsecurity/definition/cybersecurity

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BCA(System Administration and Cyber Security)

Semester-V

L-3 T-0 P-0 C-3

25SACS180T: Cloud Security

Course Objectives

- To learn about the basic concepts of network security.
- To understand the fundamentals of cloud computing security.
- To learn and practice security concerns, risk issues, and legal aspects.
- To understand how to evaluate cloud security.
- To learn about cloud computing security challenges.

Course Outcomes

Students will be able to:

1. Understand the fundamental concepts and terminology related to cloud computing and security
2. Apply the principles and best practices of cloud security, including authentication, access control, encryption, and data privacy
3. Analyze secure configuration practices for cloud infrastructure components such as virtual machines, containers, and storage services
4. Evaluate the security risks associated with cloud computing, such as data breaches, insider threats, and denial of service (DoS) attacks
5. Compare the security features and capabilities of different cloud service providers to make informed decisions about cloud adoption

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	1	-	-	2	-	1	-	-	-	-
CO2	-	-	3	1	2	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	1	-	-
CO4	1	2	-	-	3	-	-	-	-	-	2	1
CO5	-	-	1	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I: Network Security: 10 Hours

Determination of the network security policies, implementation network security policies, Reconnaissance, Vulnerability scanning, Penetration testing, post attack investigation, Cloud Delivery Models: The SPI Framework, SPI Evolution, the SPI Framework vs. the Traditional IT Model

Unit-II: Cloud Computing Security Fundamentals: **10 Hours**
Cloud Information Security Objectives, Confidentiality, Integrity, and Availability, Security attacks and threats, Cloud Security Services, Relevant Cloud Security Design Principles, and Approaches to Cloud Software Requirements Engineering, Cloud Security Policy Implementation and Decomposition

Unit-III: Security Concerns, Risk Issues, and Legal Aspects: **08 Hours**
Cloud Computing: Security Concerns, Assessing Your Risk Tolerance in Cloud Computing, Legal and Regulatory Issues.

Unit-IV: Evaluating Cloud Security: **07 Hours**
Evaluating Cloud Security, Checklists for Evaluating Cloud Security, Metrics for the Checklists

Unit-V: Cloud Computing Security Challenges: **10 Hours**
Security Policy Implementation, Policy Types, Senior Management Statement of Policy, Regulatory Policies ,Advisory Policies, Informative Policies, Computer Security Incident Response Team (CSIRT),Virtualization Security Management, Virtual Threats, Hypervisor Risks, Increased Denial of Service Risk, VM Security Recommendations, Best Practice Security Techniques, VM-Specific Security Techniques, Hardening the Virtual Machine Securing, VM Remote Access.

                                                        Total: 45 Hours

Reference Books:
1. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines.
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 & Distributors Private Limited - Mumbai; First edition (2009)
5. Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress (1 June 2011)
6. Practical Cloud Security: A Cross-Industry View by Melvin B. Greer Jr., Kevin L. Jackson CRC Press; 1 edition (2 August 2016)
7. CCSP (ISC)2 Certified Cloud Security Professional Official Study Guide 1st , Kindle Edition by Ben Malisow (Author)

List of e-Learning Resources:

1. https://nptel.ac.in/
2. https://www.coursera.org/

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BCA (System Administration and Cyber Security)

Semester-V

L-3 T-1 P-0 C-4

25SACS191T: Cloud Web Services

Course Objectives

- To know about basic concepts Artificial Intelligence.
- To learn about Search Techniques and Knowledge Representations.
- To learn and practice Python programming.
- To know about Natural Language processing.
- To know about Probabilistic Reasoning and Uncertainty.

Course Outcomes

   Students will be able to:

1. Understand the concepts of Artificial Intelligence
2. Apply the useful search techniques
3. Analyze Python Programming to program intelligent systems
4. Evaluate the strengths and weaknesses of various Natural Language Processing (NLP) methods & technologies
5. Create probabilistic reasoning models like Expert Systems, and Learning

Articulation Matrix:-

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CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	2	-	-	-	-	-	-	-	-
CO2	-	1	3	2	-	-	-	-	2	-	-	-
CO3	2	-	-	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I : Introduction & AWS Overview: 12 Hours

Introduction Cloud Computing, The History of AWS, AWS overview, AWS Global Infrastructure, AWS free tier sign up, IAM service Overview, Policies, Group, Users Management.

Unit-II: Storage & Compute Service: 12 Hours

S3 Introduction, Create an S3 Buckets, S3 Lifecycle management and glacier, Snowball, Snow edge, Snowmobile.EC2 Introduction, EC2 Linux Instance, EC2 Windows Instance, Security group, EBS, Volumes and Snapshots, Elastic File System, S3 Glacier.

Unit-III: Database on AWS & Networking Services: **12 Hours**

Database Introduction, Create a RDS Instance, DynamoDB, Aurora, Redshift, Elasticache. DNS introduction, Route S3, Register a Domain Name. Introduction VPC, Build a Custom VPC, NAT, ACL, Firewall.

Unit-IV: Applications Services: **12 Hours**

Simple Queue Service, Simple Notification Service, Simple Workflow Service, Elastic Transcoder, API gateway,

Unit-V: AWS Serverless Architecture & AWS Costs: **12 Hours**

Introduction about Lambda, learn about AWS pricing, Optimize your Cost. Create a Billing Alarm.

Total: 60 Hours

Reference Books:

1. "AWS Certified Solutions Architect - Official Study Guide: Associate Exam", Joe Baron, Hisham Baz, Tim Bixler, Biff Gaut, Kevin E. Kelly, Sean Senior, John Stamper, Sybex.

2. "Amazon Web Services in Action", Andreas Wittig and Michael Wittig, Manning Publications.

3. "AWS Certified Cloud Practitioner Study Guide: CLF-C01 Exam", Ben Piper and David Clinton, Wiley Publications.

List of e-Learning Resources:

1.https://nptel.ac.in/
2.https://www.coursera.org/

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Semester-V

L-3 T-1 P-0 C-4

25SACS192T: Programming in JAVA

Course Objectives

- To learn about the basic introduction to Java.
- To learn about classes, objects, and methods.
- To learn and practice the Collection framework.
- To know about packages.
- To know about event handling.

Course Outcomes

Students will be able to:

1. Understand the concepts of Java.
2. Apply the useful classes, objects, and methods.
3. Analyze the Collection framework.
4. Evaluate the strengths of packages.
5. Create a probabilistic event handling concept.

Articulation Matrix:-

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation))

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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CO3	-	2	-	3	-	-	1	-	-	-	-	-
CO4	1	2	-	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-: Introduction to Java :   **12 Hours**
Introduction to Java, History of Java: Comparison of Java and C++, Java as an object-oriented language: Java Features, JDK, JRE, Java virtual Machine, comments, Data types, Operators, Operators precedence and associativity, escape sequences, Type casting, Type Conversion The decision making–if, if.... else, switch, loops–for, while, do...while, special statements–return, break, continue, labeled break, labeled continue, arrays, keywords.

Unit-II: CLASSES, OBJECTS AND METHODS :   **12 Hours**
Introduction; Defining a Class; Adding Variables; Adding Variables; Adding Methods; Creating Objects; Accessing Class Members; Constructors; Methods Overloading; Static Members; Nesting of Methods; Inheritance: Extending a Class; Overriding Methods; Final Variables and Methods; Final Classes; Finalizer Methods; Abstract Methods and Classes; Visibility Control, Math class, Random Class

Unit-III: Collection framework :   **12 Hours**

LinkedList –HashSet, TreeSet, Hashtable, Strings, String functions, ArrayList, Traversing an ArrayList: using for-each loop, Iterator, ListIterator, Wrapper Classes, Auto Boxing and Unboxing. INTERFACES: Introduction; Defining Interfaces; Extending Interfaces; Implementing Interfaces; Accessing Interface Variables, Implementing Multiple Inheritance using Interfaces.

Unit-IV: PACKAGES :   **12 Hours**

Introduction; System Packages; Using System Packages; Naming Conventions; Creating Packages; Accessing a Package; Using a Package; Adding a Class to a Package; Hiding Classes.
Multithreading and Exception Handling: Basic idea of multithreaded programming, the lifecycle of a thread, creating thread with the thread class and runnable interface, Basic idea of exception handling, the try, catch and throw, throws and finally in exception handling.

Unit-V: Event Handling: **12 Hours**

Delegation Event Model, Events, Event classes, Event listener interfaces, Using delegation event model, adapter classes and inner classes. Abstract Window Toolkit: Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas. Components – Labels, Buttons, Check Boxes, RadioButtons, Choice Menus, TextFields, Text, ScrollingList, Scrollbars, Panels, Frames. Layouts: Flow Layout, Grid Layout, Border Layout, Card Layout
Swings: Classes, Working with JFrame Windows, Working with Graphics, Working with Colour, Adding and Removing Controls, Responding to Controls, Labels, Buttons, Checkbox, Checkbox Group, Choice Control, Lists, Text Field, Text Area. Menus, Dialog Box, Handling Events.
                                                                              Total: 60 Hours

Reference Books:

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill

2. D. S. Malik, "Java Programming: From Problem Analysis to Program

    Design",Cengage Learning

3. "Java: How to Program", Paul Deitel and Harvey Deitel, Pearson

4. "Java Swing", Marc Loy, Robert Eckstein, Dave Wood, and James Elliott, O'Reilly

    Media

List of e-Learning Resources:

   1.https://nptel.ac.in/
   2.https://www.coursera.org/

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BCA(System Administration and Cyber Security)

Semester-V

L-3 T-1 P-0 C-4

25SACS193T: Web Application Development Using Python

Course Objectives

- To know about basic concepts of Python.
- To learn about Django.
- To learn and practice Django URL Pattern.
- To know about Django Form and Field validation.
- To know about Authentication.

Course Outcomes

Students will be able to:

1. Understand the concepts of python
2. Apply the useful python programming with django
3. Analyze the Django URL Pattern
4. Evaluate the Django Form and Field validation
5. Create probabilistic reasoning project for Authentication and Advanced Forms processing techniques

Articulation Matrix:-

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I   **12 Hours**

Revision of Python basics: Data types, variables, conditional statements, loops etc, Introduction to various frameworks, introduction to DJango framework for web development, installing and configuring DJango and Python for web development.

Unit-II   **12 Hours**

Getting started with Django: Setting up database connections, Managing Users & the Django admin tool, Installing and using 'out of the box' Django features

Unit-III   **12 Hours**

Django URL Patterns and Views: Designing a good URL scheme, Generic Views, **MVT:**

Django's take on MVC: Model, View and Template, Small application using MVT, About the 3 Core Files: models.py, urls.py, views.py, Django project concepts

Unit-IV   **12 Hours**
Django Form and Field validation: Form classes, Validation: is_valid, full_clean, validate (), to_python (), run_validators (), clean (), raising Validation_Error

Unit-V   **12 Hours**
Authentication, Advanced Forms processing techniques, Managing Users & the Django admin tool, Installing and using 'out of the box' Django features, DJango Session, Deploying DJango, Cache framework, Security, Django admin site, Request Response object,Django template.

Total 60 Hours

Reference Books:

1. 1. Django Unleashed: by Andrew Pinkham

2. 2. The Definitive Guide to Django: by Adrian Holovaty

3. 3. Lightweight Django by Elman and Lavin

List of e-Learning Resources:

1.https://nptel.ac.in/
2.https://www.coursera.org/

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L-3 T-0 P-0 C-3

25SACS201T: Ethical Hacking

Course Objectives:
- To understand and analyze information security threats & countermeasures.
- To perform security auditing & testing.
- To understand issues relating to ethical hacking.
- To study & employ network defense measures.
- To understand penetration and security testing issues in wireless networks.

Course Outcomes:
Students will be able to:

1. Understand the importance of security in computing and the core concepts of ethical hacking.
2. Apply the knowledge of reconnaissance tools used in footprinting.
3. Analyze the various techniques of password cracking and their implications.
4. Evaluate the effectiveness of protective measures such as HTTP headers against web vulnerabilities.
5. Create a comprehensive plan for securing a wireless network, including strategies against DOS attacks.

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation isindicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	1	2
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I:ETHICAL HACKING OVERVIEW & VULNERABILITIES   09 Hours
Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit, Phases involved in hacking

Unit-II:FOOTPRINTING & PORT SCANNING   09 Hours
Foot printing - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning -

Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux OS

Unit-III:SYSTEM HACKING   **09 Hours**

Aspect of remote password guessing, Role of eavesdropping, Various methods of password cracking, Keystroke Loggers, Understanding Sniffers, Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.

Unit-IV:HACKING WEB SERVICES & SESSION HIJACKING   **09 Hours**

Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools

Unit-V:HACKING WIRELESS NETWORKS   **09 Hours**

Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.

                                                     Total 45 Hours

Reference Books:

1. Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010
2. Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
3. Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006
4. Ramachandran V, BackTrack 5 Wireless Penetration Testing Beginner's Guide (3rd ed.). Packt Publishing, 2011
5. Thomas Mathew, "Ethical Hacking", OSB publishers, 2003

List of e-Learning Resources:

1.https://www.eccouncil.org/cybersecurity-exchange/ethical-hacking/what-is-ethical-hacking/

2.https://www.udemy.com/topic/ethical-hacking/

3.https://www.udemy.com/topic/ethical-hacking/

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L-3 T-0 P-0 C-3

25SACS202T: Digital forensic

Course Objectives:
- To understand digital forensics principles and methodologies.
- To identify and preserve digital evidence legally.
- To conduct forensic analysis of digital devices and data.
- To explore tools and techniques in digital forensics investigations.
- To present digital forensic findings effectively.

Course Outcomes:
Students will be able to:
1. Explain legal and ethical implications of digital evidence handling.
2. Apply forensic analysis techniques to digital data.
3. Evaluate evidence reliability from various forensic methods.
4. Assess effectiveness of digital forensic tools in real-world scenarios.
5. Create comprehensive forensic reports with findings and recommendations.

Articulation Matrix:-
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CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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CO3	-	-	2	3	-	-	1	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	-	-	3	-	2	-	-	1	2

High-3 Medium-2 Low-1

Unit-I:Digital Forensics Science   09 Hours

Forensics science, computer forensics, and digital forensics. Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber criminalistics area, holistic approach to cyber-forensics.

Unit-II:Cyber Crime Scene Analysis   09 Hours

Cyber Crime Scene Analysis, Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

Unit-III:Evidence Management & Presentation   **09 Hours**

Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, define who should be notified of a crime, parts of gathering evidence, define and apply probable cause.

Unit-IV:Computer Forensics   **09 Hours**

Computer Forensics: Prepare a case, begin an investigation, Understand computer forensics workstations and software, conduct an investigation, complete a case, Critique a case. Network Forensics: open-source security tools for network forensic analysis, requirements
for preservation of network data

Unit-V:Mobile Forensics   **09 Hours**

Mobile Forensics: mobile forensics techniques, mobile forensics tools. Legal Aspects of
Digital Forensics: IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic
technique and methods to search and seizure electronic evidence

Total 45 Horus

Reference Books:

1. B. Nelson, A. Phillips, and C. Steuart, Guide to Computer Forensics and Investigations, 4th Edition, Course Technology, 2010
2. John Sammons, The Basics of Digital Forensics, 2nd Edition, Elsevier, 2014
3. John Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition,
4. Laxmi Publications, 2005.

List of e-Learning Resources:

1. https://www.eccouncil.org/cybersecurity-exchange/computer-forensics/what-is-digital-forensics/
2. https://www.geeksforgeeks.org/digital-forensics-in-information-security/

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BCA (System Administration and Cyber Security)

Semester-V

L-3 T-0 P-0 C-3

25SACS203T: Cyber Security and Malware Analysis

Course Objectives:

- To understand cyber security basics and common threats.
- To analyze various types of malware effectively.
- To master malware analysis and reverse engineering.
- To implement advanced malware detection and mitigation techniques.
- To explore cyber threat intelligence strategies.

Course Outcomes:

Students will be able to:

1. Understand malware characteristics and behaviors.
2. Apply malware analysis techniques effectively.
3. Analyze advanced malware detection and mitigation methods.
4. Evaluate the impact of cyber threat intelligence.
5. Create effective reports and presentations on cyber security and malware analysis.

Articulation Matrix:-

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CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	1	2
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

UNIT-I: Introduction to Networks & cyber security   **09 Hours**

Computer Network Basics, Computer network types, OSI Reference model, Page 8 of 22,TCP/IP Protocol suite, Difference between OSI and TCP/IP, What is cyber, cyber-crime and cyber-security, All Layer wise attacks, Networking devices: router, bridge, switch, server, firewall, How to configure: router, How to create LAN, **Network tools:-**P scanner, port scanner, vulnerability scanner, command tools-- netstack, traceroute, nslookup, TCP view

UNIT-II: NIST Cyber security framework   **09 Hours**

Introduction to the components of the framework, Cybersecurity Framework Tiers, What is NIST Cybersecurity framework, Features of NIST Cybersecurity framework, Functions of NIST

Cybersecurity framework, Turn the NIST Cybersecurity Framework into Reality/ implementing the framework

UNIT-III: Introduction to OWASP   09 Hours

Introduction to OWASP, OWASP Top 10 Vulnerabilities, Broken Authentication, Sensitive Data Exposure, XML External Entities (XXE), Broken Access Control, Broken Access Control, Security Misconfiguration, Cross-Site Scripting (XSS), Insecure Deserialization, Using Components with Known Vulnerabilities, insufficient Logging and Monitoring, OWASP Juice Shop, Web application firewall.

UNIT-IV: MALWARE ANALYSIS   09 Hours

Introduction to malware, Types of malware, Keyloggers, Trojans, Ran some ware, Rootkits, Antivirus, Firewalls, Malware analysis, VM ware, sandbox, create virtual machine, Process explorer, Process monitor, SYS-internals Suite, SOC-security operations controls - Solar winds (study the tools). Network intrusion detection:Wireshark, IDS, IPS, Snort.

UNIT-V: CYBER SECURITY: Legal Perspectives   09 Hours

Cybercrime and the legal landscape around the world, Indian IT ACT 2000 -Cyber crime and Punishments, Weak areas of IT ACT 2000, Challenges to Indian law and cybercrime scenario in India, Amendments of the Indian IT Act

Total: 45 Hours

Reference books:

1. Computer Networks | Fifth Edition | By Pearson (6th Edition) |Tanenbaum, Feamster & Wetherall
2. Computer Networking | A Top-Down Approach | Sixth Edition | By Pearson | Kurose James
3. F. Ross Keith W.
4. Cyber Security by SunitBelapure, Nina Godbole|Wiley Publications
5. TCP/IP Protocol Suite |Mcgraw-hill| Forouzan|Fourth Edition

List of e-Learning Resources:

1. https://intellipaat.com/blog/malware-analysis/#:~:text=Malware%20analysis%20is%20the%20process,with%20regard%20to%20sensitive%20information
2. https://www.geeksforgeeks.org/introduction-to-malware-analysis/

Prepared By	Academic Coordinator	HOD	Senior Faculty nominated by DOAA

BCA (System Administration and Cyber Security)

Semester-V

L-0 T-0 P-4 C-2

25SACS170P: Cyber Security Techniques and Tools

Course Objectives:
- To grasp basic cyber security principles, concepts, and methodologies.
- To discover tools for threat detection, analysis, and prevention.
- To implement techniques to identify vulnerabilities, mitigate risks, and counter cyber threats.
- To gain practical skills through hands-on exercises with cyber security tools.
- To cultivate critical thinking to analyze incidents, devise response strategies, and adapt to evolving threats.

Course Outcomes:
Student will be able to :
1. Understand cyber security techniques and tools for threat detection, analysis, and prevention.
2. Apply techniques and tools to identify vulnerabilities, mitigate risks, and counter cyber threats.
3. Analyze incidents and evaluate the effectiveness of measures in mitigating threats.
4. Develop practical skills through hands-on exercises with cyber security tools.
5. Cultivate critical thinking to assess threats, devise response strategies, and adapt to cyber security challenges.

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	-	1	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

UNIT-I: Operating Systems and Virtualization   12 Hours
Obtain the ISO images for the operating systems you want to install in your virtual machines, Installation of VMware - Setting Up Kali Linux, Navigate through the file system using commands like ls, cd, pwd

UNIT-II: Cryptography and Steganography   12 Hours
Implementation of Steganography, Implementation of Symmetric and Asymmetric cryptography

UNIT-III: KALI Linux Security and Networking   **12 Hours**

Implementation User Privileges and File Permissions in Linux, Use commands like ipconfig, ping, and traceroute to inspect and troubleshoot network connections, Suggested Readings: The Linux Filesystem, Net cat

UNIT-IV: Web and Mobile Security   **12 Hours**

Implementation of Windows security using firewall and other tools, Implementation to identify web vulnerabilities, Implementation of The Smartphone Pentest Framework, Implementation of Mobile Audit and generate the report of the existing Artifacts, Suggested Readings: Metasploit, Msfcli

UNIT-V: Case Studies in Cybersecurity   **12 Hours**

Case study on Nigerian frauds, Case study on the real-world examples of cybersecurity incidents, both positive and negative to illustrate the consequences of actions, Case study on Different cybersecurity tools and techniques, Case study on Software piracy

                                                        Total 60 Hours

List of Experiments

1. Implementation of Steganography
2. Obtain the ISO images for the operating systems you want to install in your virtual machines.
3. Implementation of Symmetric and Asymmetric cryptography
4. Implementation User Privileges and File Permissions in Linux.
5. Implementation of Windows security using firewall and other tools Suggested Readings: The Linux Filesystem, Net cat
6. Implementation to identify web vulnerabilities Suggested Readings: Metasploit, Msfcli
7. Implementation of Mobile Audit and generate the report of the existing Artifacts
8. Case study on Nigerian frauds.
9. Case study on the real-world examples of cybersecurity incidents, both positive and negative to illustrate the consequences of actions.
10. Installation of VMware -Setting Up Kali Linux
11. Use commands like ipconfig, ping, and traceroute to inspect and troubleshoot network connections.
12. Navigate through the file system using commands like ls, cd, pwd.
13. Implementation of The Smartphone Pentest Framework.
14. Case study on Different cyber security tools and techniques.
15. Case study on Software piracy.

Reference books:

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies (2015), Security in Computing, 5th Edition , Pearson Education .

2. Gautam Kumawat(2017), Ethical Hacking & Cyber Security Course: A Complete Package, Udemy Course (First Unit)
3. Georgia Weidman(2014) , Penetration testing A Hands- On Introduction to Hacking, no starch press II-V unit)

List of e-Learning Resources:

1.https://www.cisco.com/c/en_in/products/security/what-is-cybersecurity.html

2.https://www.techtarget.com/searchsecurity/definition/cybersecurity

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Semester-V

L-0 T-0 P-4 C-2

25SACS191P: Cloud Web Services

Course Objectives
- To know about basic concepts Artificial Intelligence.
- To learn about Search Techniques and Knowledge Representations.
- To learn and practice Python programming.
- To know about Natural Language processing.
- To know about Probabilistic Reasoning and Uncertainty.

Course Outcomes
Students will be able to:
1. Understand the concepts of Artificial Intelligence
2. Apply the useful search techniques
3. Analyze Python Programming to program intelligent systems
4. Evaluate the strengths and weaknesses of various Natural Language Processing (NLP) methods & technologies
5. Create probabilistic reasoning models like Expert Systems, and Learning

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	-	2	-	-	-	-	-	-	-	-
CO2	-	1	3	2	-	-	-	-	2	-	-	-
CO3	2	-	-	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I : Introduction & AWS Overview: **12 Hours**

Introduction Cloud Computing, The History of AWS, AWS overview, AWS Global Infrastructure, AWS free tier sign up, IAM service Overview, Policies, Group, Users Management.

Unit-II: Storage & Compute Service: **12 Hours**

S3 Introduction, Create an S3 Buckets, S3 Lifecycle management and glacier, Snowball, Snow edge, Snowmobile.EC2 Introduction, Volumes and Snapshots, Elastic File System, S3 Glacier.

Unit-III: Database on AWS & Networking Services: **12 Hours**

Database Introduction, Create a RDS Instance, DynamoDB, Aurora, Redshift, Elasticache. DNS introduction, Route S3, Register a Domain Name. Introduction VPC, Build a Custom VPC, NAT.

Unit-IV: Applications Services: **12 Hours**

Simple Queue Service, Simple Notification Service, Simple Workflow Service, Elastic Transcoder, API gateway,

Unit-V: AWS Serverless Architecture & AWS Costs: **12 Hours**

Introduction about Lambda, learn about AWS pricing, Optimize your Cost. Create a Billing Alarm.

List of Experiments

1. Creating a free tier account of AWS.
2. Define the IAM services role of AWS.
3. Create User and Group with different types of AWS Policy.
4. Create S3 Bucket. and upload any file in this bucket.
5. Create EC2 Instance with Linux OS.
6. Create EC2 Instance with Windows OS.
7. Create a security group with use of EC2 Instance.
8. Create EBS with use of EC2 Instance.
9. Create a relational database service.
10. Create VPC with the use of different network services of AWS.
11. Create a Simple Queue Service on AWS.
12. Create a Simple Notification Service on AWS.
13. Creating a billing alarm for AWS.
14. Create Server less architecture with use of AWS lambda service.
15. Create an EC2 Linux instance?
16. Create a database instance using Amazon RDS?
17. Create a billing alarm to monitor AWS costs?
18. Design an IAM policy for a group of users with specific access requirements.
19. Create a step-by-step guide for creating an S3 bucket and setting up lifecycle policies.
20. Explain the process of launching an EC2 Windows instance.

Total Hours 60

Reference Books:

1. "AWS Certified Solutions Architect - Official Study Guide: Associate Exam", Joe Baron, Hisham Baz, Tim Bixler, Biff Gaut, Kevin E. Kelly, Sean Senior, John Stamper, Sybex.

2. "Amazon Web Services in Action", Andreas Wittig and Michael Wittig, Manning Publications.

3. "AWS Certified Cloud Practitioner Study Guide: CLF-C01 Exam", Ben Piper and David Clinton, Wiley Publications.

List of e-Learning Resources:

1.https://nptel.ac.in/
2.https://www.coursera.org/

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Semester-V

L-0 T-0 P-4 C-2

25SACS192P: Programming in JAVA

Course Objectives
- To learn about the basic introduction to Java.
- To learn about classes, objects, and methods.
- To learn and practice the Collection framework.
- To know about packages.
- To know about event handling.

Course Outcomes
Students will be able to:
1. Understand the concepts of Java.
2. Apply classes, objects, and methods effectively.
3. Analyze the Java Collection framework for efficient data management.
4. Evaluate the strengths and usage of Java packages in application development.
5. Create event handling mechanisms in Java applications.

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation))

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	1	-	2	-	-	-	-	-	-	-
CO2	-	1	3	2	-	-	-	-	2	-	-	-
CO3	-	2	-	3	-	-	1	-	-	-	-	-
CO4	1	2	-	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-: Introduction to Java :   12 Hours

History of Java, Java vs. C++, object-oriented features, JDK, JRE, JVM, comments, data types, operators, control flow (if, switch), loops (for, while, do...while), special statements, arrays.

Unit-II: CLASSES, OBJECTS AND METHODS :   12 Hours

Introduction; Defining a Class; Adding Variables; Constructors; Methods Overloading; Static Members; Inheritance: Extending a Class; Overriding Methods; Abstract Methods and Classes; Visibility Control, Math class, Random Class.

Unit-III: Collection framework :   12 Hours

Key Java collections and concepts: LinkedList, HashSet, TreeSet, Hashtable; Strings and

functions; ArrayList traversal (foreach, Iterator, ListIterator); Wrapper Classes; Auto Boxing/Unboxing. Interfaces: Introduction, defining, extending, implementing; accessing variables; achieving multiple inheritance.

Unit-IV: PACKAGES :   **12 Hours**

Introduction; System Packages; Adding a Class to a Package; Hiding Classes.
Multithreading and Exception Handling: Basic idea of multithreaded programming, the lifecycle of a thread, Basic idea of exception handling (try,catch,throw and finally).

Unit-V: Event Handling: **12 Hours**

Delegation Event Model, Events, Event classes, Event listener interfaces, Abstract Window Toolkit: Window Fundamentals, Component, Container. Components – Labels, Buttons, Check Boxes, RadioButtons, Choice Menus, TextFields, Text, ScrollingList, Scrollbars, Panels, Frames. Layouts: Flow Layout, Grid Layout, Border Layout, Card Layout
Swings: Classes, Working with JFrame Windows, Working with Graphics, Working with Colour, Adding and Removing Controls, Responding to Controls, Labels, Buttons, Checkbox, Checkbox Group, Choice Control, Lists, Text Field, Text Area. Menus, Dialog Box, Handling Events.

                                                                   Total: 60 Hours

List of Experiments

1. Write a hello world program and write down the steps to compile and run it in the command line.
2. Write a program for calculating factorial of given no.
3. Write a program for bitwise operators.
4. Write a program for calculating the area of a rectangle using class.
5. Write a program using a parameterized constructor.
6. Write a program for method overloading.
7. Write a program for static members.
8. Write a program for single level inheritance.
9. Write a program for multilevel inheritance.
10. Write a program for method overriding.
11. Write a program for the use of abstract methods and class.
12. Write a program for the use of string class.
13. Write a program for vector class.
14. Write a program for implementing interfaces.

15. Write a program for thread using thread class.

16. Write a program for thread using a runnable interface.

17. Write a program for sleep, yield, stop methods of thread class

18. Write a program for creating GUI using swing.

19. Write a program to handle button click events.

20. Write a program to handle creating registration forms using swing.

Total Hours 60

Reference Books:

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill

2. D. S. Malik, "Java Programming: From Problem Analysis to Program Design",Cengage Learning

3. "Java: How to Program", Paul Deitel and Harvey Deitel, Pearson

4. "Java Swing", Marc Loy, Robert Eckstein, Dave Wood, and James Elliott, O'Reilly Media

List of e-Learning Resources:

1.https://nptel.ac.in/
2.https://www.coursera.org/

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BCA(System Administration and Cyber Security)

Semester-V

L-0 T-0 P-4 C-2

25SACS193P: Web Application Development Using Python

Course Objectives

- To know about basic concepts of Python.
- To learn about Django.
- To learn and practice Django URL Pattern.
- To know about Django Form and Field validation.
- To know about Authentication.

Course Outcomes
Students will be able to:

1. Understand the concepts of python
2. Apply the useful python programming with django
3. Analyze the Django URL Pattern
4. Evaluate the Django Form and Field validation
5. Create probabilistic reasoning project for Authentication and Advanced Forms processing techniques

Articulation Matrix:-
(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

Unit-I   **12 Hours**
Introduction to Python basics: Data types, variables, conditional statements, loops etc. Introduction to various frameworks, introduction to DJango framework for web development, installing and configuring DJango and Python for web development.

Unit-II   **12 Hours**
Getting started with Django: Setting up database connections, Managing Users & the Django admin tool, Installing and using 'out of the box' Django features

Unit-III   **12 Hours**

Django URL Patterns and Views: Designing a good URL scheme, Generic Views, **MVT:** Django's take on MVC: Model, View and Template, Small application using MVT, About the 3 Core Files: models.py, urls.py, views.py, Django project concepts

Unit-IV   **12 Hours**
Django Form and Field validation: Form classes, Validation: is_valid, full_clean, validate (), to_python (), run_validators (), clean (), raising Validation_Error

Unit-V   **12 Hours**
Authentication, Advanced Forms processing techniques, Managing Users & the Django admin tool, Installing and using 'out of the box' Django features, DJango Session, Deploying DJango, Cache framework, Security, Django admin site, Request Response object,Django template.

List of Experiments

1. Write a Python program to demonstrate the use of different data types and variables.

2. Implement a program using if-else statements to determine eligibility for voting.

3. Write a program using loops to generate the Fibonacci sequence.

4. Create a Django model representing a simple entity (e.g., a student with attributes like name, roll number, etc.).

5. Use the Django admin tool to add, edit, and delete instances of the model created in the previous program.

6. Implement a view that utilizes Django's built-in features, such as handling forms or using the Django ORM for queries.

7. Design and implement URL patterns for different views in a Django project.

8. Use generic views to handle common patterns, such as displaying a list of objects.

9. Develop a small Django application using the MVT architecture, including models, views, and templates.

10. Create a Django form for user input and display appropriate messages based on form validation.

11. Implement custom field validation in a Django form.

12. Develop a user authentication system, including login and registration views.

13. Create a form that includes advanced features like file uploads or dynamic form fields.

14. Use Django sessions to store and retrieve user-specific data.

15. Deploy a simple Django project to a platform like Heroku or PythonAnywhere.
    Cache Framework:

16. Implement caching for a frequently accessed view in a Django application.

17. Implement security measures such as CSRF protection and secure password handling.

18. Customize the Django admin site, including adding custom actions or modifying the display.

19. Create and use Django templates to render HTML pages with dynamic content.

20. Combine various concepts learned to create a small full-stack project, including database interactions, user authentication, and dynamic templates.

Total Hours 60

Reference Books:

1. 1. Django Unleashed: by Andrew Pinkham
2. 2. The Definitive Guide to Django: by Adrian Holovaty
3. 3. Lightweight Django by Elman and Lavin

List of e-Learning Resources:

1.https://nptel.ac.in/
2.https://www.coursera.org/

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Semester-V

L-0 T-0 P-8 C-4

25SACS210P: Minor Project

Course Objectives
- To solve industrial (or society or research) problems.
- To plan, schedule, and monitor the software project.
- To learn Development, coding, and testing of a large project cohesively.
- To learn Documentation of projects.

Course Outcomes

Students will be able to:
1. Understand fundamental concepts and principles relevant to their project domain.
2. Apply appropriate methodologies and technologies to design and develop a software solution or system addressing a real-world problem or need.
3. Analyze the effectiveness, efficiency, and quality of their software solution through testing, debugging, and optimization processes.
4. Evaluate their knowledge, skills, and experiences to innovate and propose enhancements or extensions to their project, demonstrating creativity and problem-solving abilities.
5. Develop solutions for contemporary problems using modern tools for sustainable development.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of the correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	3	1	-	-	-	-	-	-	-	-	-
CO2	-	2	3	1	-	-	-	-	2	-	-	-
CO3	-	1	2	3	-	-	1	-	-	-	-	-
CO4	1	-	2	-	3	-	-	-	-	-	2	1
CO5	-	1	-	2	-	3	-	-	-	-	1	2

High-3 Medium-2 Low-1

GUIDELINES FOR BCA MINOR PROJECT
1. Every student, (in a group of maximum two) will be asked to select a particular project listed by the department, on which he/she will have to develop a working module in semesters.
2. The students are expected to work on real-life project. However, it is not mandatory for a student to work on a real-life project.
3. No student will be allowed to change the topic of the project once allotted.
4. Not more than two students are permitted to work on a project.
5. The student can formulate a project problem with the help of her/his supervisor and

if approved, the students commence working on it.

6. A candidate is required to present the progress of the project work during the semester as per the schedule.

PROJECT SYNOPSIS FORMAT

The project proposal should be prepared and approved in consultation with supervisor. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. The project proposal should contain complete details in the following form:

1. Title of the project
2. Name of the supervisor (external supervisor(company)from / internal supervisor (teacher of the BCA)
3. Introduction and objectives of the project
4. Analysis (DFD, ER diagrams, class diagrams, timeline etc. As per the project requirements).
5. A complete structure which includes:
   - Name of modules and their description
   - Database / data structures description
   - Process logic of each module (flow chart)
   - Reports generation. (report format)
6. Tools / platform, hardware and software requirement specifications
7. Organization/ company details with profile of supervisor (if project is carried out outside the department)

PROJECT REPORT FORMULATION

Good quality white executive bond paper A4 size should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page specification: leftmargin-3.0cms, right margin- 2.0 cm, top margin 2.54 cm, bottom margin 2.54 cm, line spacing – single, font size – 12 for normal text, 14 for headings, 16 for chapter heading, page numbers - all text pages as well as program source code listing should be numbered at the bottom of the pages. Employ MS-Word or open-source software.

The project report should contain the following:

1. Front page – black color with golden or white text.

2. Certificate from the supervisor with her/his signature and date.

3. Certificate of originality/ self-certificate.

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