Annexure 2

COMMUNICATION SKILLS – IV

Course Code: BCU 441 **Credit Units: 01**
Total Hours: 10

Course Objective:

This course is designed to develop the skills of the students in preparing job search artifacts and negotiating their use in GDs and interviews.

Prerequisites: NIL

<table>
<tr><td colspan="3">Course Contents / Syllabus:</td></tr>
<tr><td>1.</td><td>Module I Employment-Related Correspondence</td><td>35% Weightage</td></tr>
<tr><td></td><td>• Resume Writing
• Covering Letters
• Follow Up Letters</td><td></td></tr>
<tr><td>2.</td><td>Module II Dynamics of Group Discussion</td><td>35% Weightage</td></tr>
<tr><td></td><td>• Significance of GD
• Methodology & Guidelines</td><td></td></tr>
<tr><td>3.</td><td>Module III Interviews
• Types & Styles of Interviews
• Fundamentals of facing Interviews
• Interview-Frequently Asked Questions</td><td>20% Weightage</td></tr>
<tr><td>4.</td><td>Module IV Short Stories</td><td>10% Weightage</td></tr>
<tr><td></td><td>• Proof of the Pudding - O. Henry
• “The Lottery” 1948 – Shirley Jackson
• The Eyes Have it- Ruskin Bond
• Kallu- Ismat Chughtai
All the four stories will be discussed in one class.
One Long Question will be set in the Exam from the Text.</td><td></td></tr>
<tr><td>5.</td><td>Student Learning Outcomes:
• Develop a resume for oneself
• Ability to handle the interview process confidently
• Learn the subtle nuances of an effective group discussion</td><td></td></tr>
<tr><td>6.</td><td>Pedagogy for Course Delivery:
• Workshop
• Group Discussions
• Presentations
• Lectures</td><td></td></tr>
<tr><td>7.</td><td>Assessment/ Examination Scheme:
<table>
<tr><th>Theory L/T (%)</th><th>Lab/Practical/Studio (%)</th><th>End Term Examination</th></tr>
<tr><td>100%</td><td>NA</td><td>70%</td></tr>
</table>
Theory Assessment (L&T):
<table>
<tr><th>Components (Drop down)</th><th>CIE</th><th>Mid Sem</th><th>Attendance</th><th>End Term Examination</th></tr>
<tr><td>Weightage (%)</td><td>10%</td><td>15%</td><td>5%</td><td>70%</td></tr>
</table></td><td></td></tr>
</table>

Text: *Sharma, R.C. & Krishna Mohan. Business Correspondence and Report Writing: A Practical approach to Business & Technical Communication, New Delhi: Tata McGraw Hill & Co. Ltd., 2002.*

Rai, Urmila & S.M. Rai. Business Communication, Mumbai: Himalaya Publishing House, 2002.

Rizvi, M.Ashraf. Effective Technical Communication, New Delhi: Tata McGraw Hill, 2007.

Reference: *Brusaw, Charles T., Gerald J. Alred & Walter E. Oliu. The Business Writer’s Companion, Bedford: St. Martin’s Press, 2010.*

Lewis, Norman. How to Read Better and Faster. New Delhi: Binny Publishing House.

- **Additional Reading: Newspapers and Journals**

Annexure 2

BEHAVIOURAL SCIENCE - IV

Course Code: BSU 443 **Credit Units: 01**
Total Hours: 10

Course Objective:
This course aims at imparting an understanding of Values, Ethics & Morality among students for making a balanced choice between personal & professional development.

Course Contents:

Module I: Introduction to Values & Ethics **(2 Hours)**

Meaning & its type
Relationship between Values and Ethics
Its implication in one's life

Module II: Values Clarification & Acceptance **(2Hours)**

Core Values-Respect, Responsibility, Integrity, Resilience, Care, & Harmony
Its process-Self Exploration
Nurturing Good values

Module III: Morality **(2 Hours)**
Difference between morality, ethics &values
Significance of moral values

Module IV: Ethical Practice **(2 Hours)**

Ethical Decision making
Challenges in its implementation
Prevention of Corruption &Crime

Module V: Personal & Professional Values **(2 Hours)**
Personal values-Empathy, honesty, courage, commitment
Professional Values-Work ethics, respect for others
Its role in personality development
Character building-"New Self awareness"

Student learning outcomes

- Able to answer the question: What do I stand for?
- Ability to apply a coherent set of moral principles within professional and specialized contexts
- Willing to make unpopular but right decision
- Committed to working for justice and peace locally and globally

Examination Scheme:

Evaluation Components	Attendance	Journal of Success (JOS)	Social Awareness Program (SAP) SAP Report/SAP Presentation	End Semester Exam	Total
Weightage (%)	5	10	15	70	100

Text & References:

- Cassuto Rothman, J. (1998). From the Front Lines, Student Cases in Social Work Ethics. Needham Heights, MA: Allyn and Bacon.
- Gambrill, E. & Pruger, R. (Eds). (1996). Controversial Issues in Social Work Ethics, Values, & Obligations. Needham Heights, MA: Allyn and Bacon, Inc.

APPLIED CRYPTOGRAPHY AND NETWORK SECURITY

Course Code : CSC 401 **Credit Units: 03**
Total Hours: 45

Course Objective:
The Internet is changing life as we know it – bringing new economic and social opportunities to communities throughout the world and increasing the global demand for information and communication technology (ICT) skills. Security and risk management skills are among the most highly sought-after skills in networking, and demand continues to grow. Organizations around the world are experiencing a shortage of qualified ICT candidates with the specialized knowledge and skills needed to administer devices and applications in a secure infrastructure, recognize
network vulnerabilities and mitigate security threats.

- Understanding about the fundamental concepts of Network Security and role of cryptography.
- To transfer a message securely over insecure channel.
- To be able to maintain the confidentiality, Integrity and Availability of a data transferred over a Network.

Course Contents:
Module I: Introduction to Applied Cryptosystems: (7 Hours)
Protocols for identification and login: Interactive protocols, ID protocols, Password protocols, Challenge-response protocols, Schnorr's identification protocol, Proving properties in zero knowledge, One-sided authenticated key exchange, Security of protocol AKE1, Protocol PAKE0, Protocol PAKE1, Protocol PAKE2.
Module II: Fundamentals of Security Protocols and usage: (9 Hours)
Security Protocols and Standards, SCP, SSH, SSL, TLS, STARTTLS, IPSec, VPN, HTTPS; Encrypting and Signing Emails: PGP- GPG/open PGP, DKIM and SPF; Single Sign On (SSO)-OAUTH and OPENID, Signature and Anomaly based detection, Honeypots and Honeynets, Network Log management-syslog or SPLUNK; RBAC: Role mining; DNS-Dig tool: DNSSEC-DS and NSEC records
Module III: Implementation of Cryptosystems: (7 Hours)
Authenticated Key Exchange: Goals for authentication and Key Establishment, encryption-based protocol and its attacks, Perfect forward secrecy, Protocol based on ephemeral encryption, Attacks on Insecure variations, Identity protection, Password authenticated key exchange – Phishing attacks, Explicit key confirmation.
Module IV: Network Security Primitives (7 Hours)
Classes of Key Agreement protocols, Pairing based cryptographic protocol, ID based encryption schemes, Conference Key protocols, Security goals, Static and dynamic groups, Key exchange protocol, Techniques for Network Protection, Monitoring and Detection, Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls, Proxies, NAT, ACL.
Module V: Security issues and solutions: (8 Hours)
Intrusion Detection System-Snort, Attack Techniques: Network reconnaissance-Nmap and vulnerability audits-openVAS; DNS based attacks, Phishing-DNSTwist; Network based malware attacks: Remote access Trojan Poison Ivy and Domain name generation algorithm based Botnets; LAN attacks: ARP Cache poisoning-Ettercap/arp spoof, MAC flooding, Man in the middle attacks, Port Stealing, DHCP attacks, VLAN hopping; Network Sniffing - Wireshark and Password Cracking-John the Ripper; Attacks on SSL/TLS: SSL stripping, Drown and Poodle attack; Network packet creation and Manipulation using scapy and dpkt libraries.
Module VI: Protecting the Network Infrastructure: (7 Hours)
Network Services such as NTP, SNMP are used to provide facilities such as time synchronization among all devices, health status, etc. If these Services are not configured properly, these become vulnerable to attacks, VPN, IPSec, RADIUS and TACACS+, Intrusion Prevention System, Operation of Host-Based and Network-Based Intrusion Prevention Systems, Content and Endpoint Security.

Course Outcomes:
The student will learn

- Understand various techniques for Network Protection and explore new tools and attacks in network security domain
- Exploring DNS, DNS based attacks and DNSSEC
- Familiarize the LAN based attacks and its mitigations
- Exploring Secure Network Communication protocols and attacks

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

Text & References:

- William Stallings, Cryptography and Network Security: Principles and Practice,8th Edition, Pearson edition, 2020.
- Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill.
- W. Stallings, Network Security Essentials: Applications and Standards, Pearson Prentice Hall.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.
- Boyd, Colin, Anish Mathuria, and Douglas Stebila. Introduction to Authentication and Key Establishment. Protocols for Authentication and Key Establishment. Springer, Berlin, Heidelberg; 2020
- Boneh, Dan, and Victor Shoup. A graduate course in applied cryptography.

APPLIED CRYPTOGRAPHY AND NETWORK SECURITY LAB

Course Code : CSC 421 **Credit Unit: 01**
Total Hours: 30

Course Objective:
IoT Fundamentals curriculum provides students with a comprehensive understanding of the Internet of Things (IoT). It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business.

Program List:
1. Describe the security threats facing modern network infrastructures**: (3 Hours)**
2. Secure network device access and Administer effective security policies**: (3 Hours)**
3. Implement AAA on network devices**: (3 Hours)**
4. Mitigate threats to networks using ACLs**: (3 Hours)**
5. Implement secure network management and reporting**: (3 Hours)**
6. Mitigate common Layer 2 attacks**: (3 Hours)**
7. Implement the Cisco IOS firewall feature set**: (3 Hours)**
8. Implement an ASA**: (3 Hours)**
9. Implement the Cisco IOS IPS feature set**: (3 Hours)**
10. Implement site-to-site IPSec VPNs**: (3 Hours)**

Course Outcomes:
The student will learn
- Understand key IoT concepts with Big Data.
- Understand Data Analytics and Machine Learning.
- How IOT work with Big Data.

Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- W. Stallings, Network Security Essentials: Applications and Standards, Pearson Prentice Hall.
- Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education.
- C. Kaufman, R. Perlman and M. Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.

Annexure 2

DISCRETE MATHEMATICS

Course Code : CSE 401 **Credit Units: 04**
Total Hours: 40

Course Objectives:
Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

(1) Use mathematically correct terminology and notation. (2) Construct correct direct and indirect proofs.
(3) Use division into cases in a proof. (4) Use counterexamples.
(5) Apply logical reasoning to solve a variety of problems.

Course Contents:

Module I: Fundamentals-Sets, Relations and Functions: (10 Hours)
Sets, Subsets, power sets, set operations/set identities, upper and lower bounds of a set, least upper bound (lub)/supremum, greatest lower bound (glb)/infimum. Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, Matrix Representation of relations. Functions, properties of functions, composition of functions, inverse, unary, binary and n-ary operations, Characteristic function, Permutation function, composition of cycles. Growth of functions: big theta, little oh, big oh and big omega notations.

Module II: Counting: (8 Hours)
The Fundamental Principles, Permutations, Combinations, Combinatorial Identities, Principle of Inclusion and Exclusion (PIE), Pigeonhole Principle, Pascal's triangle. Recurrence relations, solution methods for linear, first-order recurrence relations with constant coefficients.

Module III: Logic: (8 Hours)
Propositions and Logical Operations, Conditional Statements, Equivalences, Tautologies and Contradictions, Normal Forms, The Theory of Inference. Predicate calculus: Predicates, The Statement Function, Free and Bound Variables, Universal and Existential Quantifiers, Universal Specifications. Methods of Proof: Direct Proof, Proof by Contradiction, Principle of Mathematical Induction.

Module IV: Lattices and Boolean Algebra: (8 Hours)
Partially Ordered Sets, Lattices, Lattices as algebraic structures, Sublattices, Direct product and Homomorphisms, Boolean Algebra: Definitions and Examples, Subalgebra, Direct Product and Homomorphisms, Boolean Functions, Representation and Minimization of Boolean Functions.

Module V: Graphs and Trees: (6 Hours)
Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring. Tree, Properties of Tree, Spanning Tree, Fundamental Circuit, Cut-Set, Cut-Vertices. Incidence Matrix, Adjacency Matrix.

Course Outcomes:

- For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
- For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.
- For a given a mathematical problem, classify its algebraic structure
- Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
- Develop the given problem as graph networks and solve with techniques of graph theory.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Text/Reference Books:

- Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw –Hill
- Susanna S. Epp., Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
- C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw –Hill.
- J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, Tata McGraw -Hill
- Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
- Discrete Mathematics, Tata McGraw -Hill

Annexure 2

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: CSE 402 **Credit Units: 03**
Total Hours: 30

Course Objective:
To conceptualize the basics of organizational and architectural issues of a digital computer. To analyse performance issues in processor and memory design of a digital computer. To understand various data transfer techniques in digital computer. To analyse processor performance improvement using instruction level parallelism.

Course Contents:

Module I: Overview of Computer Architecture & Organization: (6 Hours)
Introduction of Computer Organization and Architecture. Basic organization of computer and block level description of the functional units. Performance measure of Computer Architecture. Introduction to buses and connecting I/O devices to CPU and Memory, bus structure.

Module II: CPU and Register Transfer Operations: (6 Hours)
Instruction Codes, Computer Registers, Computer Instructions, Register Transfer Language, Timing and Control, Instruction Cycle, Memory, Input-Output and Interrupt Reference Instructions, Signed multiplication, Booth's algorithm. Division of integers: Restoring and non-restoring division Floating point arithmetic: Addition, subtraction.

Module III: Processor Organization and Architecture: (8 Hours)
Introduction to CPU Architecture, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Control Unit: Soft wired (Micro-programmed) and hardwired control unit design methods. Microinstruction sequencing and execution. Micro operations. Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit.

Module IV: Memory Organization: (5 Hours)
Memory hierarchy and characteristics. Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative Memory. Virtual Memory, Concept, Segmentation and Paging, Page replacement policies.

Module V: I/O Organization and Peripherals: (5 Hours)
Input/output systems, I/O modules and IO processor. Pipeline processing, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Types of data transfer techniques: Programmed I/O, Interrupt driven I/O and DMA. Introduction to parallel processing systems.

Course Outcomes:

- Ability to understand basic structure of computer.
- Ability to perform computer arithmetic operations.
- Ability to understand control unit operations.
- Ability to design memory organization that uses banks for different word size operations.
- Ability to understand the concept of cache mapping techniques.
- Ability to understand the concept of I/O organization.
- Ability to conceptualize instruction level parallelism

Examination Scheme:

Components	A	CT	S/V/Q/HA	ESE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

Text & References:

Text:

- Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw-Hill.
- John P. Hayes, “Computer Architecture and Organization”, Third Edition.
- William Stallings, “Computer Organization and Architecture: Designing for Performance”, Eighth Edition, Pearson.
- B. Govindarajulu, “Computer Architecture and Organization: Design Principles and Applications”, Second Edition, Tata McGraw-Hill.

Reference:

- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”, Narosa Publishing, 1998.
- Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH, 2000.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, “Computer Organization,” McGraw hill.
- Tennenbaum,” Structured Computer Organization,” PHI
- B. Ram, “Computer Fundamentals architecture and organization,” New age international Gear C. w., “Computer Organization and Programming, McGraw hill.

Annexure 2

JAVA PROGRAMMING

Course Code: CSE 403 **Credit Units: 03**
Total Hours: 30

Course Objective:
The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:

Module I : (7 Hours)
Object Oriented Programming: Concept and features of object-oriented programming, create classes and objects and add methods to a class, Real World Comparison. Evolution of JAVA: History of Java, Requirements and Environment (JDK), Comparison with other languages, Basic Features & Java Architecture-Java Virtual Machine (JVM), Installing Java Development Kit, Program Structure- Data types, Variables and Operators. Arrays

Module II : (7 Hours)
Classes and Objects in Java: Understanding Constructors, Dealing with Garbage Collection. Working with Inheritance in Java: Understanding Abstract Classes and Interfaces. Packages: Introduction to packages, How to implement a package, CLASSPATH Setting for Packages, Types and understanding packages.

Module III : (6 Hours)
Multithreaded Programming: Basic concepts and needs of multi-threading, Life Cycle of a Thread, How to create a thread, Handling Thread Priorities, Enforcing Thread Synchronization, Maintaining Inter-thread Communication. Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, Use of try, catch, finally, throw, throws in Exception Handling.

Module IV : (7 Hours)
GUI Programming -Introduction to AWT, Window Fundamentals, Working with Graphics, Using AWT Controls and Menus, Understanding Layout Managers. JFC and Swing - A Higher Level of User Interaction, Features of the Java Foundation Classes, Overview of Swing, Components and Containers, Swing Packages, Exploring Swing components ,Generating Swing Application

Module V : (3 Hours)
Event Handling -The Delegation Event Model, Event Classes, Event Listener Interfaces Handling Various Events.

Course Outcomes:

The student will learn:

- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
- Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
- Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
- Students can demonstrate ability to implement multithreading in the programming.
- To learn syntax and features of exception handling
- Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings.
- To demonstrate the ability to handle Events in the Programming

Annexure 2

Examination Scheme:

Components	A	CT	S/V/Q/HA	ESE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

Text & References:

Text:

- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

References:

- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script" , Tata McGraw Hill,1999

Annexure 2

OPERATING SYSTEMS

Course Code : CSE 404 **Credit Units: 03**
Total Hours: 30

Course Objective:
Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system: (6 Hours)
Operating system overview-objectives and functions, Batch processing, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system. Operating System structure, Operating System Services, System Program and System calls.

Module II: Process Management: (10 Hours)
Process: Process concept, State model, process scheduling, CPU Scheduling, Scheduling Algorithms-Non Preemptive and preemptive Strategies, Multiprocessor Scheduling. Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization: Producer Consumer Problem, Reader writer's problem. Critical regions, Monitors. Threads.

Deadlock: Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

Module III: Memory Management: (6 Hours)
Main Memory: Contiguous Allocation, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, paged replaced algorithm, Allocation of frames, Thrashing.

Module IV: Device management: (4 Hours)
Mass Storage system: Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, Disk space management.

Module V: File System and I/O System: (4 Hours)
File System: File Concept, File Organization and Access Mechanism, File Directories, Allocation method.
I/O Systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem,

Module VI: Industrial Visit
Visit to industry in the field of Computer Science & Engineering.

Course Outcomes:

At the end of the course, the students should be able to:

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems**.**

Examination Scheme:

Components	A	CT	S/V/Q/HA	ESE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test,:, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination;

Annexure 2

Text & References:

Text:

- Milenekovic, “Operating System Concepts”, McGraw Hill
- A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

References:

- Dietel, “An introduction to operating system”, Addision Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India.

Annexure 2

JAVA PROGRAMMING LAB

Course Code: CSE 423 **Credit Units: 02**

Total Hours: 40

Course Objective:
programming in the Java programming language, knowledge of object-oriented paradigm in the Java programming language, the use of Java in a variety of technologies and on different platforms.

Course Contents :
Lab Experiments are based on the course Java Programming (CSE 403)

1. Lab assignment will be based on the following:

1. Use Eclipse or NetBeans platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop. :**(4 Hours)**
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero. :**(4 Hours)**
3. Develop an applet in Java that displays a simple message.: **(02 Hour)**
4. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked. :**(02 Hour)**
5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 andNum2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box. :**(4 Hours)**
6. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. :**(4 Hours)**
7. Write a Java program that connects to a database using JDBC and does add, delete, modify and retrieve operations. :**(02 Hour)**
8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially there is no message shown. :**(02 Hour)**
9. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape. : **(2 Hours)**
10. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout. :**(4 Hours)**
11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes). :**(02 Hour)**
12. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab. It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables). :**(02 Hour)**
13. Implement the above program with database instead of a text file. :**(02 Hour)**
14. Write a Java program that takes tab separated data (one record per line) from a text file and inserts them into a database. :**(02 Hour)**
15. Write a java program that prints the meta-data of a given table. :**(02 Hour)**

Course Outcomes:

- knowledge of the structure and model of the Java programming language, (knowledge)
- use the Java programming language for various programming technologies (understanding)
- develop software in the Java programming language, (application)
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
- propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)

Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA – Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

Text:

- Java Fundamentals - A comprehensive Introduction, Herbet Schidt and Dale Srien, TMH.

References:

- Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education (OR) Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
- Object Orientd Programming through Java, P. Radha Krishna, Universities Press.
- Thinking in Java, Bruce Eckel, Pearson Education
- Programming in Java, Bruce Eckel, Pearson Education
- Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.

Annexure 2

OPERATING SYSTEMS LAB

Course Code: CSE 424 **Credit Unit: 01**
Total Hours: 20

Course Objectives:

- To introduce Basic Unix general purpose Commands.
- To learn vi editor.
- To learn shell script.
- To learn file management and permission commands.

Software Required: UNIX SCO

Course Contents :

Lab Experiments are based on the course Operating Systems (CSE 404)

Following experiments should be performed in lab:

1. Write a shell Script to assign a file permission to the given file using Symbolic Mode/Absolute Mode: **(1 Hour)**
2. To compresses a file using gzip and pack commands.: **(1 Hour)**
3. To find a given pattern in a list of files of current directory using grep and fgrep commands.: **(1 Hour)**
4. Write a shell script to create two directories and store five files in one directory using the related commands and to transfer all the files to another directory.: **(1 Hour)**
5. write a shell script to accept a file name as input and display whether it exits or not. If it exists, then give the details of its attributes like access permission, its size etc.: **(1 Hour)**
6. Shell Script to find out the sum of the given numbers using command line argument.: **(1 Hour)**
7. Write a shell script to find the largest among the 3 given numbers also write a shell script to find the smallest.: **(1 Hour)**
8. Write a shell script to find sum of digits of a number.: **(1 Hour)**
9. Write a shell scripts which works similar to the Unix commands Head Tail.: **(1 Hour)**
10. Write a shell script to find the sum, the average and the product of the four integers entered.: **(1 Hour)**
11. Write a shell script to find how many terminals has this user logged in.: **(1 Hour)**
12. Write a shell script to reverse a number supplied by a user.: **(1 Hour)**
13. Write a script to find the value of one number raised to the power of another.: **(1 Hour)**
14. Write a shell script, which will receive any number of filenames as arguments. The shell script should check whether such files already exist.: **(1 Hour)**
15. Write a shell script, which will receive any number of filenames as arguments. The shell script should check whether such files already exist.: **(1 Hour)**
16. Write a shell script to reverse the contents of a file: **(1 Hour)**
17. Write a script to count and report the number of entries in each subdirectory mentioned in the path, which is supplied as a command-line argument.: **(1 Hour)**
18. Write a shell program to add, subtract and multiply the 2 given numbers passed as command line arguments**: (1 Hour)**
19. Write a menu driven shell script for Copy a file, remove a file, Move a file.: **(1 Hour)**
20. Write a shell program to add, subtract and multiply the 2 given numbers passed as command line arguments.: **(1 Hour)**

Course Outcomes:

- Identify the basic Unix general purpose commands.
- Apply and change the ownership and file permissions using advance Unix commands.
- Use the awk, grep, perl scripts.
- Implement shell scripts and sed.
- Apply basic of administrative task.

Annexure 2

Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- "Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

Annexure 2

FRENCH – IV

Course Code: FLU 444 **Credit Unit: 02**
Total Hours: 20

Course Objective:
To strengthen the language of the students in both oral and written
To revise the grammar in application and the communication asks related to topics covered already
To get acquainted with the current social communication skills, oral (dialogue, telephone conversations, etc.) and written and perform simple communication tasks such as

- Talking about personal habits
- Narrating events in the past, marking the stages, using appropriate connectors
- Holding conversations on telephone
- Asking for/giving advices

Course Contents:

Dossier7–pg65-74,
Dossiers1,2and3(révision)
Dossier7:auboulot
ActesdeCommunication:
Parlerdeshabitudesetdécrireunesituationàl'imparfait,comparer(nometverbe),qualifier(qui,que)s'exprimer autéléphone,demanderet donnerunavis.

Dossiers1,2,3–Révision
Exercicesd'écoute,productionorale et écrite.

Grammaire :
1. l'imparfait,
2. lacomparaisonduverbe/dunom ; mieux/meilleur
3. lespronomsrelatifs

Examination Scheme:

Components	INTERNAL				EXTERNAL	GRAND TOTAL
	MID-SEM	VIVA-VOCE	ATTENDANCE	TOTAL	END SEMESTER	100
Weightage (%)	15	10	5	30	70	

Text &References:

Le livre àsuivre:

- Andant,Christineet al.A proposA1Livre del'élève.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Andant,Christineet al.A proposA1Cahierd'exercices.Grenoble:Pressesuniversitairesde Grenoble,2010.
- Girardeau,Brunoet NellyMous.Réussirle DELFA1.Paris: Didier,2010.

FORMAL LANGUAGES AND AUTOMATA THEORY

Course Code: IT 401 **Credit Units: 03**
Total Hours: 45

Course Objective:
Students will able to understand the formal mathematical models of computation along with their relationships with formal languages. In particular, they will learn regular languages and context free languages which are crucial to understand how compilers and programming languages are built. Also students will learn that not all problems are solvable by computers, and some problems do not admit efficient algorithms. Throughout this course, students will strengthen their rigorous mathematical reasoning skills.

Course Contents:

Module I: Finite Automata and Regular Languages: (11 Hours)
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA‟s with and without €-moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- – Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

Module II: Grammars: (11 Hours)
Grammar Introduction– Types of Grammar – Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – Unit productions – Null productions – Greibach Normal form – Chomsky normal form – Problems related to CNF and GNF. Chomsky hierarchy of languages.

Module III: Pushdown Automata (7 Hours)
Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma. Linear Bounded Automata (LBA).

Module IV: Turing Machines: (7 Hours)
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Variation of TM, Universal TM, Church's Machine. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP

Module V: Introduction to compiler (9 Hours)
Compilers Analysis of source Program, The Phases of a compiler, The tasks of a compiler, Analysis of the Source Program, Phases and Passes in compilers, Cousins of the compiler, The Grouping of phases, Compiler - construction tools. Lexical Analysis - The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzer, Review of Regular Expressions, Finite State Machines, Finite Automata based, Pattern Matching. Specification and recognition of tokens, a language for specifying lexical analyser

Course Outcomes:

At the end of this course, students will be able to do the following:

- Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages.
- Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.
- Students will learn that certain problems do not admit efficient algorithms, and identify such problems.
- Students will learn basic concepts of compiler.

Examination Scheme:

Components	A	CT	S/V/Q/HA	ESE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, ESE: End Semester Examination.

Text & References:

Text:

- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2^{nd} ed)" by Peter Linz, D. C. Health and Company.
- Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley

References:

- "Introduction to theory of computation (2^{nd} Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Ullman, Principles of Compiler Design, Narosa publications.

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

Syllabus

Programme Name: B. Tech. (Computer Science and Engineering)		**Session:**2024-28
Course Code: IT 402	**Course Name:** CYBER SECURITY AND DIGITAL FORENSICS	**Semester:** IV

Credits (Total)	**L**	**T**	**P**	**Marks (Internal/External**		**Contact Hours (per week)**	**Independent Study Hour (per week)**	**Section (Group)**
3	3	0	0	40	60	3	3	
UG level						**Basic and applied**	**Student-specific course outcome**	**Higher Education Research Placement**

Course Objective:

To provide an understanding of Computer forensics fundamentals. To analyze various computer forensics technologies. To provide computer forensics systems. To identify methods for data recovery. To apply the methods for preservation of digital evidence.

Course outcomes: After completion of course, the student will be able to:

CO-1	Understand the definition of Digital forensics fundamentals.
CO-2	Describe the types of digital forensics technology.
CO-3	Analyze various digital forensics systems.
CO-4	Illustrate the methods for data recovery, evidence collection and data seizure.
CO-5	Summarize duplication and preservation of digital evidence.

Teaching Pedagogy:

T1	Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry based teaching
T2	ABL activities, Assignments, Flip Class/ Seminars, Quiz, Oral Viva-voce examination

Assessment Tools

AT1-1	Quiz

AT1-2	Activity Based Learning
AT1-3	Midterm Exams
AT1-4	Flip Class
AT1-5	Seminar Presentation
AT1-6	Assignments
AT1-7	Poster
AT1-8	Oral Viva-voce examination
AT1-9	Industrial Visit Report

Prerequisites: Basic knowledge of computer networks.

Suggested reading:	● Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley ● Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss Cyber Security Policy Guidebook, John Wiley & Sons 2012. ● Vivek sood, Cyber law simplified, Tata Mc GrawHill, E ducation (India). Eoghan Casey, Handbook of digital forensic and investigation. ● References: ● Clint P Garrison, Digital forensic for network, internet and cloud computing. ● Panagiotis Kandlis, Digital crime and forensic science in cyberspace, information society S.A Greece IDEA Group Publishing. ● John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles, River Media, 2005 ISBN: 1584503890, 9781584503897
Suggested e- resources (Websites/e-books)	**https://onlinecourses.nptel.ac.in/noc23_cs127/preview**

SYLLABUS

Module wise contents details	Assessment tools
Module I: Introduction: (9 Hours) Introduction, Classifications of Cyber Crimes: E - Mail Spoofing, Spamming, Cyber defamation, Industrial Spying/Industrial Espionage, Hacking, Software Piracy, Password Sniffing, Credit Card Frauds, Cyber stalking, Botnets , Phishing, Pharming, Man - in - the - Middle attack, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, DoS and DDoS Attacks , SQL Injection, Buffer Overflow	Quiz Mid-term Exam Assignment
Module II: Cybersecurity Concepts: (9 Hours) Introduction to Cyber Security, Cyber Security Goals, Cyber Security policy, Domain of Cyber Security Policy, Elements, Cyber Security Evolution, Implementing Hardware Based Security, Software Based Firewalls, Security Standards, Assessing Threat Levels, Forming an Incident Response Team	Mid-Term Quiz Assignment
Module III: Digital Forensics Fundamentals: (9 Hours) Introduction to Digital Forensics, Use of Digital Forensics in Law Enforcement, Digital Forensics Assistance to Human Resources/Employment Proceedings, Digital Forensics Services, Benefits of Professional Forensics Methodology.	Mid-Term Oral Viva-voce examination Seminar Presentation
Module IV: Types of Computer Forensics Technology: (9 Hours) Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware. Protecting Data from Being Compromised, Avoiding Pitfalls with Firewalls	Quiz, Assignment, Industrial Visit,Report Seminar, Presentation
Module V: Cyber Law and Cyber Crime: (9 Hours) Introduction to IT laws & Cyber Crimes, Cyber Laws, IPR, Legal System of Information Technology, Social Engineering. Reporting Cybercrime, Difference between cyber forensics and cyber security.	Quiz, Assignment, Industrial Visit, Report, Poster, Oral Viva-voce examination

Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	20%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking the End Semester examination. The dispensation of 25% includes all types of leaves. including medical leaves.	A	5%
End Semester Examination	End Semester Examination	ESE	60%
Total			**100%**

Abbreviations: CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ESE: End Semester Examination; A: Attendance

Course Articulation Matrix (Mapping of COs with POs)

Course Outcomes	**Correlation with POs**												**Correlation with PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1	3	1				2		2	1			
CO2	3	2	2	2	2				2		1	1			
CO3	3	2	2	2	2				3		3	1			
CO4	3	3	2	3	2				1		2	1			
CO5	2	2	1	2	3				2		2	1			

1: strongly related, 2: moderately related and 3: weakly related