MAHARSHIDAYANANDSARASWATI UNIVERSITYAJMER

Syllabus

Bachelor of Science – Information Technology (BSC-IT)

BSC-ITPart – II& III
(Session- 2024 – 25)
Semester- III, IV, V, VI

MaharshiDayanandSaraswatiUniversity
Ajmer

TEACHING AND EXAMINATION SCHEME

Bachelor of Science – Information Technology

W.E.F. 2024-2025 (CBCS)

Semester III

Category	Type	Code	Paper Name (Theory)	Lec	Tut	Max Marks		Credits (L+T)
						Sessional	Semester	
-	AEC	BIT-301	Discrete Mathematics	1		30	70	**2**
CC	DCC	BIT-302	Computer Architecture	3	1	30	70	**6**
CC	DCC	BIT-303	Programming in Java	3	1	30	70	**4**
CC	DCC	BIT-304	Web Programming	3	1	30	70	**4**

Category	Type	Code	Paper Name (Practical)	Prac Hrs	Max Marks	Credits (P)
AE	SEC	BIT-305	Lab-Java Programming	3	50	**2**
AE	SEC	BIT-306	Lab-Web Programming	3	50	**2**

Total of Theory & Practical Marks& Credits	**500**	**20**

Semester IV

Category	Type	Code	Paper Name (Theory)	Lec	Tut	Max Marks		Credits (L+T)
						Sessional	Semester	
-	AEC	BIT-401	Computer Based Statistics	1		30	70	**2**
CC	DCC	BIT-402	Visual Programming	3	1	30	70	**6**
CC	DCC	BIT-403	Android Programming	3	1	30	70	**4**
CC	DCC	BIT-404	Operating System	3	1	30	70	**4**

Category	Type	Code	Paper Name (Practical)	Prac Hrs	Max Marks	Credits (P)
AE	SEC	BIT-405	Lab-Visual Programming	3	50	**2**
AE	SEC	BIT-406	Lab- Android Programming	3	50	**2**

Total of Theory & Practical Marks& Credits	**500**	**20**

TEACHING AND EXAMINATION SCHEME

Bachelor of Science – Information Technology

W.E.F. 2024-2025 (CBCS)

Semester V

Category	Type	Code	Paper Name (Theory)	Lec	Tut	Max Marks		Credits (L+T)
						Sessional	Semester	
-	AEC	BIT-501	Internet-of-Things	1		30	70	**2**
CC	DCC	BIT-502	Programming in Python	3	1	30	70	**6**
CC	DCC	BIT-503	Artificial Intelligence	3	1	30	70	**4**
CC	DCC	BIT-504	Computer Graphics	3	1	30	70	**4**

Category	Type	Code	Paper Name (Practical)	Prac Hrs	Max Marks	Credits (P)
AE	SEC	BIT-505	Lab-Python & Computer Graphics	3	50	**2**
AE	SEC	BIT-506	Lab-Internet-of-Things & AI	3	50	**2**

Total of Theory & Practical Marks& Credits	**500**	**20**

Semester VI

Category	Type	Code	Paper Name (Theory)	Lec	Tut	Max Marks		Credits (L+T)
						Sessional	Semester	
-	AEC	BIT-601	Research Methodology	1		30	70	**2**
CC	DCC	BIT-602	Design Analysis & Algorithms	3	1	30	70	**6**
CC	DCC	BIT-603	Data Mining with R	3	1	30	70	**4**
CC	DCC	BIT-604	Cyber Security	3	1	30	70	**4**

Category	Type	Code	Paper Name (Practical)	Prac Hrs	Max Marks	Credits (P)
AE	SEC	BIT-605	Lab-Data Mining with R	3	50	**2**
AE	SEC	BIT-606	Internship	3	50	**2**

Total of Theory & Practical Marks& Credits	**500**	**20**

Scheme of Examination

Theory:

Part A:

1. 10 Question of 2 mark each – 20 marks
2. Answer should not exceed more than 50 words
3. All questions are compulsory

Part B:

1. 10 Questions of 10 marks each – 50 marks
2. Answer should not exceed more than 400 words
3. at least three question from each unit be set and student will have to answer five question, selecting at least one question from each unit

Sessional:

There will be sessional (internal assessment) of 30 marks conducted by the department.

Practical:

Practical exams shall be conducted by one internal and one external examiner of a batch of 20 students in a day.

Duration of Practical exam is 3 hours.

A Laboratory Exercise File should be prepared by each student for each practical paper and should be submitted during practical examinations.

Practical of 50 marks distribution is as under:

a. 30 marks for practical examination exercise for 3 questions
b. 10 marks for Viva-voce
c. 10 marks for Laboratory Exercise File

Eligibility:

10+2 with 50% marks in aggregate.

BIT- 301 Discrete Mathematics

Unit 1

Sets: definition and types, set operations, partition of set, cardinality, recursive definition of set. Functions: concept, some special functions (polynomial, exponential & Logarithmic, absolute value, floor & ceiling, mod & div functions) properties of functions, cardinality of infinite set, countable and uncountable set, pigeon hole principle, composition of function

Relations: Boolean matrices, binary relation, adjacency matrix of relation, properties of relations, operations of relations, connectivity relation, transitive closure, Warshall Algorithm, equivalence relation, equivalence class

Unit 2

Proof Methods: Vacuous, trivial, direct, indirect by contrapositive and contradiction, constructive & non-constructive proof, counterexample. The division algorithm, divisibility properties (prime numbers & composite numbers) principle of mathematical induction, the second principle of mathematical induction, fundamental theorem of arithmetic. Algorithm correctness: partial correctness, loop invariant, testing the partial correctness of linear and binary search, bubble and selection sorting

Unit 3

Graph theory: Graphs, directed, undirected, simple, adjacency & incidence, degree of vertex, sub-graph, complete graph, cycle & wheel graph, bipartite & complete bipartite graph, weighed graph. Trees: spanning trees – Kruskal'sAlgo, finding spanning tree using depth first search, breadth first search, complexity of graph, minimum spanning tree.

BIT-302Computer Architecture

Unit 1

Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits. Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, The map Method, Two – and Three – Variable Maps, Four – Variables Map .

Unit 2

Arithmetic Circuits and Sequential Logic, Logic gates NAND and NOR Implementation, Other Two-Level Implementations, Don't Care Conditions. Introduction, Adders, Subtractors, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, BOOTH algorithm for signed numbers with example. Sequential Logic: Introduction, different types of Flip – Flops, Triggering of Flip- Flops, Boolean algebra, combinational circuits, circuit simplification, sequential circuits

Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes.

Unit 3

Assembly Language and Input /Output Organization and The Memory System, Basics of Assembly Language Program, Examples from Assembly Language Programming. Accessing I/O Devices, Interrupts, Enabling and Disabling interrupts, Handling multiple devices, Controlling input/output device behavior, Exceptions, DMA , Buses.

Basic Concepts, Semiconductor RAM Memories, Internal organization of memory chips, Static memories, Dynamic RAM, Synchronous D-RAM, Structure of larger memories, Read – Only Memories, Speed, Size, and Cost, Cache Memories, Virtual Memories, Memory Management Requirements

BIT-303 Programming in Java

Unit 1

Introducing Data Types and Operators, Java's Primitive Types, Literals, Variables, operators, Type conversion in Assignments, Cast, Operator Precedence, Expressions.

Program Control Statements, Input characters from the Keyboard, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nestedswitch statements, for Loop, Enhanced for Loop, While Loop, do-while Loop, Use break, Use continue, Nested Loops**.**

Introduction to Classes, Objects and Methods, Class Fundamentals, Reference Variables and Assignment, Methods, Using Parameters, Constructors, Parameterized Constructors, The new operator.

Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Usingthe Length Member, The Bitwise operators.

Unit 2

String Fundamentals, The String Constructors, Three String-Related Language Features, The Length() Method, Obtaining the characters within a string, String comparison, using indexOf() and last IndexOf(),Changing the case of characters within a string, StringBuffer and StringBuilder.

Method Overloading, Overloading Constructors, Recursion

Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to CallSuperclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy

Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References,Implementing Multiple Interfaces, extending Interfaces

Unit 3

Package Fundamentals, Packages and Member Access, Importing Packages, Static Import

The Exception Hierarchy, Exception Handling Fundamentals, using Multiple catch clauses, Catching subclass Exceptions, nested try blocks, Throwing an Exception

Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, Thread Communication using notify(), wait() and notifyAll(), suspending, Resuming and stopping Threads.

BIT-304 Web Programming

Unit 1

HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Color controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages.

Cascading Style Sheets, introduction, levels of style sheetsstyle specification formats, selector forms, property value forms, font properties, list properties, color, alignment of text, the box model, background images, the and tags, conflict resolution.

Unit 2

Overview of JavaScript, object orientation and JavaScript, syntactic characteristics, primitives, operations, and expressions, screen output and keyboard input, control statements, object creation and modification, arrays, functions, constructors, pattern matching using regular expressions, errors in scripts.

Unit 3

JavaScript execution environment, the Document Object Model, elements access in JavaScript, events and event handling, handling events from body elements, handling events from text box and password elements, the DOM2 event model, the navigator object, DOM tree traversal and modification, positioning elements, moving elements, element visibility, changing colors and fonts, dynamic content, stacking elements, locating the mouse cursor, reacting to a mouse click, slow movement of elements, dragging and dropping elements.

BIT-401 Computer Based Statistics

Unit 1

Types and Presentation of Data: Concept of statistical population and data, qualitative & quantitative data, discrete & continuous data, frequency & non-frequency data, geographical & chronological data. Primary data and secondary data, tabular presentation of data-construction of tables, types of tables, frequency distribution – discrete, grouped, continuous and cumulative. Graphical presentation of data-histogram, frequency polygon, frequency curve, ogives and box-plot.

Unit 2

Statistical analysis of quantitative data: Mean, Mode, Median, Different types of scales-nominal, ordinal, intervals and ration, univariate data-measures of central tendency, dispersion, moments and its computation from data. Absolute and relative measures of skewness and kurtosis based on quintiles and moments.

Unit 3

Curve fitting and Theory of Attributes: Principle of least squares, fitting of straight line, parabola and curves reducible to straight line (exponential and power curve). Class frequency, order of a class frequency, ultimate class frequency, consistency of data, independence and association of attributes. Various measures of association.

Statistical Analysis of Bivariate Data: Correlation analysis-scatter diagram. Correlation of bivariate frequency distribution. Regression analysis-fitting of regression lines, regression coefficients and their properties.

BIT-402 Visual Programming

Unit 1

.NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries, variables -Declaring variables, Data Types, Forcing variables declarations, Scope & lifetime of a variable, Control flow statements: conditional statement, loop statement. Constants, Arrays, types of arrays, Collections.

Subroutines, Functions, Passing variable number of arguments, Optional Arguments, Returning value from function, Msgbox&Inputbox, overloading, constructor, inheritance,overriding,interfaces

Unit 2

Working with Forms: Loading, showing and hiding forms, controlling one form within another.Textbox, Label, Button, Listbox, Combobox, Checkbox,PictureBox, RadioButton, Panel, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar,OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog, LinkLabel, Designing menus:ContextMenu, access &shorcut keys.

Unit 3

Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB.

BIT – 403Android Programming

Unit 1

Mobile Application Development - Mobile Applications and Device Platforms - Alternatives forBuilding Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile ApplicationDevelopment Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End-KeyMobileApplicationServices-WhatisAndroid-Androidversionhistory-ObtainingtheRequired Tools- Launching Your First Android Application-Exploring the IDE-Debugging YourApplication-PublishingYourApplication

Unit 2

Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications-Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

Unit 3

Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views- Using WebView- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.Sharing Data in Android-Creating Your Own Content Providers -Using the Content Provider- SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

BIT – 404 Operating Systems

Unit 1

Introduction to Operating Systems, goals of OS, operation of OS, resource allocater and related functions, classes of OS, batch processing, multi-processing, time sharing, distributed, real time systems, system calls, system programs

Process concept, interacting process, threads, fundamental of scheduling, scheduling criteria, long medium short term scheduling, scheduling algorithms , structure of concurrent system, critical section, critical region, inter-process communication, monitor and semaphores, implementation and uses.

Unit 2

Logical versus physical address, swapping, contiguous allocation, segmentation, paging, segmentation with paging, kernel memory allocation, page replacement algorithm, virtual memory, virtual memory with paging, demand paging, dead lock, characterization, methods for handling dead locks, prevention, avoidance, thrashing, allocation of frame, virtual memory using segmentation,

Files and Directories – File Concept, File types, File system Structure, file metsdata – Inodes, kernel support for file, system calls for file I/O operations – open, create, read, write, close, Iseek, dup2, file status information – sata family, file and record locking – fcntifuction, file permissions – chmod, fchmod, file ownership – chown, Ichown, fchown, links – soft links and hard links – symlink, link, unlink.

Unit 3

Directories – Creating, removing and changing Directories – mkdir, rmdir,chdir, obtaining current working directory – getcwd, Directory contents, Scanning Directories – opendir, readdir, closedir, rewinddir functions.

Process – process concept, Process environment – environment list, environment variables, getenv, setenv, system call interface for process management – fork, vfork, exit, wait, waitpid, exec family,
Shell programming with Bourne again shell (bash) – Introduction, shell respnsibilites, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shall variables, command substitutions, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, fictions, debugging shell scripts.

BIT-501 Internet-of-Things

Unit 1

Introduction to IoT components, Characteristics IoT sensor nodes, Edge computer, cloud andperipheral cloud, single board computers, open source hardware, Examples of IoT infra-structure

IoT protocols and softwares, MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP,XMPP and gateway protocols,

Unit 2

IoT point to point communication technologies, IoT Communication Pattern, IoT protocol Architecture, Selection of Wireless technologies (6LoWPAN, Zigbee, WIFI, BT, BLE,SIG,NFC, LORA, Lifi, Widi)

Unit 3

Introduction to Cloud computation and BigData analytics, Evolution of Cloud Computation, Commercial clouds and their features, open source IoT platforms, cloud dashboards, Introduction to big data analytics and Hadoop.

IoT security, Need for encryption, standard encryption protocol, lightweight cryptography, Quadruple, Trust Model for IoT-A – Threat Analysis and model for IoT-A, Cloud security

IoT application and its Variants. Case studies: IoT for smart cities, health care, agriculture, smart meters.M2M, Web ofthings, Cellular IoT, Industrial IoT, Industry 4.0, IoT standards.

BIT-502 Programming in Python

Unit 1

Python Basics: Keywords, Identifiers, Indents, Input Output Basic Syntax, Variable, Dynamic Typing, Data Types (Mutable and Immutable), Built-in Conversion Methods.

Operator: Arithmetic, Comparison, Logical, Identity, Membership.

Control Statements: Conditional (If, If- else, Elseif, Nested if-else), Looping (While, For, Nested loops), Break, Continue, Pass, range().

Array: Introduction, Creation, Traverse, Insertion, Deletion, Search, Update.

Unit 2

String: Introduction, Types, Escape Sequences, Formatting, Built-in Methods: Capitalize, Upper, Lower, Title, Find, Count, isAlpha(), isDigit(), isLower, isUpper, Basic Operations : Accessing, Updating, Concatenation.

List & Tuple: Introduction, Accessing, Operators, Built-in Methods (Len, Max, Min, Append, Insert, Remove, Pop, Reverse, Sort, List), Basic Operations (Updating, Delete, Concatenation, Indexing, Slicing), Regular Expressions, List as a stack, List as a Queue.

Set: Introduction, Accessing, Built-in Methods (Add, Update, Clear, Copy, Discard, Remove), Operations (Union, Intersection, Difference).

Dictionary: (Single Dimensional) Introduction, Accessing, Updating, Deleting, Viewing values in dictionaries, Built-in Methods (Len, Max, Min, Pop, Clear, Items, Keys, Values, Update), Sorting and Looping, Nested Dictionaries.

Unit 3

Function: Defining, Calling, Function Arguments (Required, Keyword, Default, Variable Length) Anonymous Functions, Global and Local Variables, Recursion, lambda function.

Modules: Introduction, Importing Module, Built-in Modules (Math, Statistics, Random), dir (),

Package: Creating, Installing, Importing Modules from the Package.

Errors & Exception: Introduction of Errors & Exceptions, Error Types, Exception Handling - Introduction, Try, Except, Else, Finally, Raising Exceptions, Invoked Functions.

File Input-Output: Opening and Closing files, File Modes, Reading and Writing files, File Types, File Position, Rename, Delete Files, Dictionary methods.

Tuples: Creating, Utility, Accessing values, updating, deleting, basic operations, Assignment, returning multiple values, nested values.

BIT-503 Artificial Intelligence

Unit 1

Definition of AI, Application of AI, knowledge-based systems, representation of knowledge organization and acquisition of knowledge

Syntax, semantics of propositional logic, syntax and semantics of FOPL, conversion to clausal form, inference rule, resolution principles

Unit 2

Bayesian probabilistic inference, possible word representation, Dempster-Shafer Theory, Expert system, natural language processing

Unit 3

Introduction to Deep learning, Backpropagations algorithm, initialization, deep neural network, introduction of generative adversarial network, Markov decision process,RNN Basics, Advance RNN, LSTN, GRU, Bi directional neural network, shallow neural network.

Implementation with MATLAB: Heuristic search 8 puzzle problem, missionaries and cannibals problems, water-jug problem, linear problem, block word problem, hill climbing methods and other AI related problems.

BIT-504 Computer Graphics

Unit 1

Interactive graphics, passive graphics, advantage of interactive graphics, classification of application

Point, line, DDA algorithm, Bresenham's line algorithm, circle generating algorithm, polynomial and spline curves algorithms, clipping operation, point, line, Cohen-Sutherland line clipping

Unit 2

2D transformation, matrix representation of 2D, composite transformation, translation, rotation, scaling, general pivot-point rotation, general fix scaling, reflection, shear, affine transformations and transformation functions

Unit 3

Parallel projection, perspective projection, 3D transformation, rotation, scaling, composite transformation, 3D transformation function.

BIT-601 Research Methodology

Unit 1

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.

Unit 2

Teaching- Learning Process Chalk and talk method / PowerPoint Presentation. Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward

Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.

Unit 3

Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments. Teaching-Learning Process Chalk and talk method / PowerPoint Presentation

Introduction to Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India.

BIT-602 Design Analysis & Algorithms

Unit 1

INTRODUCTION: Notion of Algorithm, Review of Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithms Brute Force Approaches: Introduction, Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching.

DIVIDE AND CONQUER: Divide and Conquer: General Method, Defective Chess Board, Binary Search, Merge Sort, Quick Sort and its performance.

Unit 2

THE GREEDY METHOD: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Paths.

DYNAMIC PROGRAMMING: The General Method, Warshall's Algorithm, Floyd's Algorithm for the All-Pairs Shortest Paths Problem, Single-Source Shortest Paths: General Weights, 0/1 Knapsack, The Traveling Salesperson problem.

Unit 3

LIMITATIONS OF ALGORITHMIC POWER AND COPING WITH THEM: Lower-Bound Arguments, Decision Trees, P, NP, and NP-Complete Problems, Challenges of Numerical Algorithms.

COPING WITH LIMITATIONS OF ALGORITHMIC POWER: Backtracking: n - Queens problem, Hamiltonian Circuit Problem, Subset – Sum Problem.
Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesperson Problem.
Approximation Algorithms for NP-Hard Problems – Traveling Salesperson Problem, Knapsack Problem

BIT-603 Data Mining with R

Unit 1

Introduction to data mining, DM techniques, issues and challenges in DM, Applications, association rules, Prior, Dynamic Itemset counting, FP-tree growth, Incrementallearning

Unit 2

Clustering Techniques, k-Medoid algorithm, Hierarchical, categorical clustering algorithm, Decision tree, best split, splitting indices and criteria, decision tree construction algorithm, CART, ID3, rain Forest, Pruning Technique

Data mining using NN, web mining, temporal and spatial data mining.

Unit 3

Introduction- Basic elements of R, data input and output, objects, attributes, number , vectors , array, matrix, lists, Reading data from files , controls statements, loops , functions, R scripts, data science overviews, data visualisation using graphics in R, GGplot 2, File format of graphics output, introduction to hypotheses, types of hypothesis, data sampling, confidence and significance level, hypothesis tests, parametric test, non-parametric test

BIT-604 Cyber Security

Unit 1

Cyber Security- Layers of security, Vulnerability, Assets and Threat, Challenges and Constraints - Computer Criminals - CIA Triad - Motive of attackers - Spectrum of attacks - Taxonomy of various Attacks – Cryptography - Security Governance – Challenges and Constraints, Security Models and Risk Management, Legacy Cyber security systems – Transformations in Cyber security.

Cyber Security Technologies, Mobile Security – Advanced Data Security: Cloud Security, IoT Security - Incident detection response - Penetration testing – User Behavior Analytics (UBA) – Endpoint Detection and Response (EDR).

Unit 2

Vulnerabilities and Safeguards Software Vulnerabilities - Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, poor cyber security awareness - Cyber Security Safeguards – Overview, Access control, Audit, Authentication, Biometrics, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Scanning, Security policy, Threat Management, Defending malicious software, Applying software update and patches.

Securing Infrastructure and Local Host Infrastructure security in the real world and challenges – Understanding access control and monitoring systems: Access control security policies, Physical security controls – Intrusion detection and Reporting systems – Securing host device and challenges – Protecting the inner perimeter – Protecting remote access: Local protection tools, local intrusion detection tools, configuring browser security, Hardening operating systems.

Unit 3

Cyber Security Tools Zenmap – Hydra –Kismet – John the Ripper – Airgeddon – Deauther Board – Aircrack-ng – EvilOSX.

Cyber Security Strategies Need for building cyber strategy – Cyber-attack strategies (Red team) – Cyber defense strategies (blue team) – Introduction to Cyber security kill chain – Reconnaissance – Weaponization – Privilege Escalation - Exfiltration - Threat Life cycle management phases.