Sophia Girls' College (Autonomous),
Ajmer

Department of Computer Science

Course Plan

Dr. Ritu Bhargava

SESSION 2022-23

COURSE PLAN

ODD SEMESTER			
S. No.	**Class**	**Semester**	**Paper**
1.	BCA/ I.M.Sc.	V	BCA-501/IMSC-501 Open Source Operating System
2.	I.M.Sc.	VII	IMSC-703 Data Science using R
3.	M.Sc. CS	III	MCS-303 Data Warehouse and Mining
4.	VCA	V	VCA-502 Database Technologies-I

SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
BCA- III 2022-23

SEMESTER V BCA

Open Source Operating System BCA – 501

Max. Marks: 50(40Ext; 10 Int) Min Marks: 20(16 Ext;4 Int) Credit: 02

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM V JULY	**UNIT-I** Introduction of Open Source Software, Need of Open Source, comparison with Closed source / Proprietary software.	Understand Open Source Operating System	PPT, Assignments Group Discussions	1.Understand the structure and functionalities of an OS 2.Understand concept of Linux File System 3. Apply shell commands in Linux programming	***Highorder-*** Write a shell script to find out the given number is palindrome or not ***Understanding-*** Explain Different File System of OS ***Knowledge-*** Compare the MV and CP command	Knowledge--25 Understanding-45 Higher Order-30
	Linux Architecture, Linux file system (inode, Super block, Mounting and Un-mounting)	Analysing structure of OS	PPT			
AUGUST	Types of File system, Kernel, Process Management in Linux.	Compare EXT2,FAT,NTFS	PPT			
	UNIT-II Shell Commands: user access commands, directory commands, file manipulation commands, security and protection commands, inter user and inter-machine communication,	Illustrate Shell Commands	PPT, Presentations by students			

SEPTEMBER	Information commands, process management commands, program development and debugging commands, system administration commands, I/O	Execution of Shell Commands	PPT & Quiz			
	Redirection and Piping, Relation and Absolute path, hard link and soft link, Linux Directory types, User and its Home Directory Vi editor					
OCTOBER	**UNIT-III** Shell Programming – Introduction to Shell, Various Shell of Linux, Shell Variables, Shell keywords, Positional Parameters	Role of Positional Parameter	PPT and Hands –on – Exercises in Lab			
	control statements- if-then-else, case-switch, While, Until, Find, Shell Metacharacters	Searching files using Metacharacters and execute shell scripts	Hands –on – Exercises in Lab			
NOVEMBER	. Booting and Shutting down Boot Loaders: LILO, GRUB, Bootstrapping, init Process.	Compare different Loaders.	Hands –on – Exercises in Lab			

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SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
I.M.Sc (COMPUTER SCIENCE) 2022-23

SEMESTER VII (I.M. Sc. (CS) **DATA SCIENCE USING R IMSC–703**

MAX MARKS: 100(70EXT; 30 INT) **MIN. MARKS: 40(28 EXT; 12 INT)**

COURSE PLAN

SEM/ Month	UNIT/TOPIC	Concepts/Facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM VII JULY	**UNIT –I** ntroduction- Basic elements of R, data input and output, objects, attributes, number, vectors. Factors ,Creating matrices – Matrix operations – Applying Functions to Matrix Rows and	Analyse Data Input, Output in R Studio. Reading and Writing in Text and CSV Files.	PPT & Hands- on – exercises on Data Science Analysis Software (R Studio)	1. Understand the basics in R programming in terms of constructs, control statements and understand the use of R for Data analytics. 2. Obtain, clean/process, and transform	HIgh order: Convert the vector c(2,0.5,1,2,0.5, 1,2,0.5,1) to a vector of only 1s, using a vector of length 3.	Knowledge--25 Understanding -45 Higher Order-30

	Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction .Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists, dataframes Reading data from files, controls statements, loops, functions, R scripts	Extraction and Accessing of data from Vextor, Factor, Matrices, lists, dataframes and from dimensions. Adding and Deleting data from datasets.	Lab Assignments in R Studio	data and analyse and interpret data using an responsible approach. 3. Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues	Understanding: How would you write a custom function in R? Give an example. Knowledge: What are the steps to build and evaluate a linear regression model in R?	
AUGUST	**UNIT-II** Data science overviews, data visualisation using graphics in R,	Understand Data Science techniques	Flow Charts , Diagrams and Understanding			

	Gplot 2, File format of graphics output.		of Datasets			
	Data sampling, confidence and significance level, hypothesis tests, parametric test, non-parametric test.	Critically analyse different classification and clustering algorithms	PPT, PDF's & Quiz			
SEPTEMBER	**UNIT-III** Introduction to Regression Analysis, types of regression analysis, nonlinear regression, cross validation, principal component analysis, factor analysis		Quiz & Group Presentations by Students			

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OCTOBER	Association rules, Apriori algorithm classification its types, logistics, support vector machine, k-nearest neighbour	Analyse Market Basket Analysis	PPT, Problem Solving Activities	Use classification methods and various clustering techniques for categorizing data		
NOVEMBER	Naïve Bayes classification, decision tree classification, random forest classification, evaluating classifier model, introduction clustering, clustering methods		PPT & Lab Exercise in R Studio			

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SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
M.SC COMPUTER SCIENCE 2022-23

SEMESTER III (M. Sc (CS) FINAL) **DATA WAREHOUSE & MINING MCS-303**

MAX MARKS: 100(70EXT; 30 INT) **MIN. MARKS: 40(28 EXT; 12 INT)**

COURSE PLAN

SEM/ Month	UNIT/TOPIC	Concepts/Facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM III SEPTEMBER	**UNIT-I** Data Warehousing: Introduction to Data Warehouse, Data mart, Data warehouse architecture, Multidimensional Data Model (data cube)	Analyse DataWarehouse models	PPT, Group Discussions	Understand the concepts of data warehouse and data mining	HIigh order: Analyse weather dataset and retrieve results using Apriori algorithm.	Knowledge--25 Understanding-45 Higher Order-30
	OLAP Techniques : Roll-up, slicing and dicing, drilldown, pivot, Approaches to OLAP servers (MOLAP,ROLAP,HOLAP) OLTP, data transformation, loading).	Compare OLAP techniques				
COTOBER	Warehouse schema(star	Compare different	PPT, Practice		Understanding:	

	schema, snowflake schema, fact constellation) metadata,. Data Warehouse ETL Process (data extraction, data cleaning,	Models	exercise		Compare OLAP and OLTP Knowledge:	
NOVEMBER	**UNIT-II** Data Mining: Introduction, Definition, KDD vs. DM, DBMS vs. DM, DM Techniques: verification model, discovery model: discovery of association rule, discovery of classification rule, clustering, discovery of frequent episodes, deviation detection,	Evaluation of DM Techniques	PPT	Analyze transaction databases for association rules	Explain Warehouse schema.	
	Issues and Challenges in DM, DM Applications (Business and E-commerce, Scientific, Engineering and Health care, Web data)					

	UNIT-III Association Rules, Market basket analysis, Association Rules: Apriori Algorithm, Partition, Incremental, FP-tree growth algorithms, learning techniques(supervised and unsupervised) Classification: Hierarchical and non-hierarchical techniques, Partitioning.	Analyse Market Basket Analysis	PPT, Problem Solving activities	Use classification methods and various clustering techniques for categorizing data		
DECEMBER	Clustering: K-MEDOID Algorithm K-means clustering, hierarchical clustering. Decision Trees: decision tree, types of decision tree Decision tree induction, Tree pruning.	Critically analyse different classification and clustering algorithms	PPT & Lab Exercise on Data Mining Software			
	Extracting classification rules from decision trees, Decision tree construction algorithms: CART, ID3, J48, Decision tree construction with presorting.		PPT & Hands- on – exercises on Data Mining Software in Lab			

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SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
VCA- III 2022-23

V.C.A III (SEMESTER V) **Database Technologies – I VCA - 502**

Max. Marks: 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM V JULY	**UNIT-I** Overview and History of DBMS. Basic DBMS terminology, File Processing System v/s DBMS. Advantages and disadvantages of DBMS, DBA and his responsibilities, ,	Importance of database and role of DBA	PPT, Quiz, Problem Solving activities	Identify the concepts of database its types .Database and its concepts Architecture And data model implementation	*Knowledge Based* -What is DBMS? -Illustratethe difference between file processing and dbms? *Understanding Based* -Compare the data abstraction layers? -Classify 2 and 3 tier architecturer? *Higher Order Thinking Skills Based* -Justify that a child can have only one parent with	Knowledge--60 Understanding-30 Higher Order-10
	Data Abstraction, physical and logical data independence Architecture of DBMS: Client/server architecture, 2 Tier & 3 Tier.	Identifying different tier architecture of DBMS	Match the following, Quiz, Demonstration, Group Discussions			
	Overview of hierarchical, network and relational models, comparison of network, hierarchical and	Comparison of Data Models	Models and Demonstration, presentations			

	relational models.		by students		example?	
AUGUST	**UNIT-II** Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, degree of relationship, Relationships, keys(types),	Concept of constraints and implementation	PPT		-Critically Evaluate constraints and its types?	
	Generalization, Specialization, Aggregation, Implementation of sequential, random & indexed sequential file organization.	Distinguishing File Organization methods	PPT		What benefits extended ER models have over ER models? What is the role of Normalizartion?	
SEPTEMBER	**UNIT-III** Relational Model: Storage organization for relations, Relational Algebra: Set Operators (Union ,Intersection, Set Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, degree of relationship, Relationships, keys(types),	Implementing constraints in database	PPT, Quiz	Compare and analyze the different relational operators and implementation. Implementation of Normalization and its forms		
OCTOBER	**Relational Model:** Storage organization for	Implementing relational Algebra with	PPT, Problem		Let the two relation schema be R(A,B)	

	relations, **Relational Algebra:** Set Operators (Union ,Intersection, Set-Difference, Cartesian Product), **Relational Operators:** (Select, Project, Rename, Join), E.F.Codd's rules,	queries	Solving on Database		and S(A,B). What will be the equivalent of A Intersection B	
NOVEMBER	Schema refinement and Normal forms: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form,Normalization-Decomposition into BCNF Decomposition into 3-NF.	Normalization and its forms	PPT, Case Studies			

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Session 2022-23
EVEN SEMESTER

S.No.	Class	Semester	Paper
1	BCA/I.M.SC.	II	BCA- 201/IMSC-201Data Structures and Algorithm
2	BCA/I.M.SC.	VI	BCA- 602/IMSC-602 Information Security & Protection
3	VCA	VI	VCA -602 Database Technologies-II

SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
B.C.A-IMSC I (SEMESTER II) 2022-23
Digital Computer Fundamentals BCA- 201

Max. Marks: 50(40Ext; 10 Int) Min Marks: 20(16 Ext;4Int) Credit: 02

COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM II DECEMBER	**UNIT-I** **Number systems:** Decimal numbers , Binary numbers : Counting in binary, The weighted structure of binary numbers, Octal numbers, hexadecimal numbers and their mutual conversions	Perform Number Conversions from one System to another System	PPT, Comparison charts, Practice Problems	Understand the basic number system and their conversions	*Knowledge Based* Explain Universal Gates- *Understanding Based* - Convert Decimal Number 27 into Binary *Higher Order Thinking Skills*	Knowledge--60 Understanding-30 Higher Order-10
JANUARY	Binary arithmetic : Addition, subtraction, multiplication and division of binary numbers, 1's and 2's complement, BCD numbers, BCD addition, BCD subtraction,	Perform different arithmetic operations	PPT, Practice Problems			
	Gray code: Binary to Gray code conversion, Gray to Binary conversion	Perform different arithmetic operations	Comparison Charts			
FEBRUARY	**UNIT-II** **Boolean algebra:** Boolean operations and expressions, Laws and rules of Boolean		PPT, Diagrams, Models	Identify the logic gates and their functionality		

	algebra, Demorgan's Theorem, Boolean expressions, Simplification of Boolean expression.				*Based* Proove that AB+BC+BC'= AB+C	
	Logic Gates: AND gate, OR gate, NOT gate, NAND gate , NOR gate , X-OR gate , X-NOR gate, The universal property of NAND gate and NOR gate, Realization of basic gates.	Design various logic gates and Truth Tables	PPT, Truth Tables, Diagrams	Understand how logic circuits and Boolean algebra forms as the basics of digital computer.		
MARCH	Boolean expression for logic circuits, Karnaugh map SOP with examples.		PPT, Diagrams, Practice Examples			
	UNIT-III Combinational Circuits: Half adder, Full adder, Half subtractor, Full subtractor	Design basic electronic Circuits(combinational circuits)	Diagrams , PPT	Analyse and design different circuits Understand and design of various circuits		
APRIL	Decoders, Encoder , Multiplexer, Demultiplexer.	Demonstrate the Working of circuits	Diagrams, PPT			
	Sequential Circuits: Latches: SR latch, Clocked flip-flops: SR flip-flop, D flip-flop, JK flip-flop, Master slave JK flip-flop.	Demonstrate the building up of Sequential and combinational logic from basic gates.	PPT, Comparison chart, Diagrams			

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SOPHIA GIRL'S COLLEGE (AUTONOMOUS), AJMER
BCA-III 2022-23

SEMESTER VI BCA

Information Security & Protection BCA – 602

Max. Marks: 50(40Ext; 10 Int)

Min Marks: 20(16 Ext;4 Int)

Credit: 02

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM VI DECEMBER	**UNIT-I** Introduction to the concepts of security: need for security, types of attacks.	Understand concept of Security	PPT & Group discussion	1.Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks 2.Understand the concept of encryption and analyze various symmetric & asymmetric encryption algorithm	***Highorder-*** Encrypt "Attack is tonight " using Hill Cipher ***Understanding-*** Explain RSA algorithm ***Knowledge-*** Compare Active and Passive attacks	Knowledge--25 Understanding-45 Higher Order-30
JANUARY	Cryptographic techniques: plain text and cipher text substitution and transposition techniques.	Analysing Transposition and substitution techniques	PPT, Group discussions			
	Caesar cipher, modified Caesar cipher, monoalphabetic cipher, Vigenere cipher, hill cipher, Vernam Cipher. stegnography, key range and key size.	Understanding security algorithms	PPT, Assignments based on Encryption & Decryption Algorithms			

FEBRUARY	**UNIT-II** Computer based symmetric key cryptographic algorithm: Introduction, algorithm types: stream cipher and block cipher and mode	Illustrate Symmetric and Asymmetric key Cryptography	PPT & Exercises based Security Techniques	3.Familiarize with network security designs using available secure solutions such as SSL and IPSeC		
	ECB, CBC, CFB, OFB. An overview of symmetric key cryptography, basics of data encryption standard DES		PPT & Quiz			
MARCH	Computer based asymmetric cryptographic algorithm: Introduction of asymmetric key cryptography, an overview of asymmetric key cryptographic, and the RSA algorithm.		Numerical Exercises on RSA Algorithm			
	UNIT-III Internet security protocols: basic concepts, secure socket layer SSL	Compare different user authentication methods	PPT & Quiz			
APRIL	Secure hyper text transfer protocol. User authentication mechanism: passwords					
	Certificate based authentication, biometrics authentication.					

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VCA- III 2022-23

V.C.A III (SEMESTER VI) **Database Technologies – II VCA - 602**

Max. Marks : 75 (50Ext; 25 Int) Min. Marks: 30(20 Ext;10 Int) Credit: 03

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
SEM VI DECEMBER	UNIT-I Relational query language: DDL, DML, DCL, database integrity: entity integrity, domain integrity, referential integrity.	Database Recovery and failure	PPT, Quiz, Group Discussion	1.Identify the concepts of Transaction and Concurrency 2. Illustrate the different Database Integrity 3. Application of SQL commands using Oracle	*Knowledge Based* -What is Transaction and its Life Cycle? -Illustrate the difference between concurrency types? *Understanding Based* -Compare different recovery techniques? *Higher Order*	Knowledge--60 Understanding-30 Higher Order-10
JANUARY	Security, authorization access matrix, concurrency control, locking, serializability, recovery techniques.	Identifying concurrency and serializabillity in database	Match the following, Quiz			
FEBRUARY	UNIT-II Transaction management, life cycle of transaction, ACID Properties, E.F.Codd's rules,	Transaction life cycle	PPT & Class Assignments			

	Constraints: Null Constraint, Primary Key, Unique key constraint,Foreign Key constraint,domain key constraint, Check Constraints, & Not Null.	Comparison of Database Integrity			*Thinking Skills Based* -Create the database with constraints -Critically Evaluate constraints and its types? Can you add constraint on table that has already some data?	
MARCH	Searching, Matching & Basic Oracle Functions: String, Numeric, and Aggregate Functions. **UNIT-III** Introduction to SQL: Characteristics of SQL, Advantages of SQL	Concept of constraints and implementation Creation of Database	PPT, Quiz, Problem Solving Activities & Hands –On-Exercises in LAB			
APRIL	SQL data types and literals, Types of SQL commands, SQL operators, Tables, views and indexes, Queries based on group by clause, order by clause, having clause, Unions, Intersection, Minus SQL. Sub queries & joins.	Implementing Oracle Functions Implementing Set operators Implementing Sub Queries and Join Operations	PPT and Hands on Exercises on SQL			

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