

No.: PMEB-1/Spl./28(1)/2021-22

Date: 17-04-2023

NOTIFICATION

Sub.: Syllabus and Examination pattern of **BCA (Hons.) (Cloud Computing & Digital Science)** course under Specialized Programmes from the academic year 2023-24 reg.

- Ref.: 1. Decision of the BOS Meeting held on 07-01-2023.
2. Decision of the Faculty of Science & Technology meeting held on 15-03-2023.
3. Decision of the Academic Council meeting held on 24-03-2023.

The Board of Studies in **BCA (Cloud Computing & Digital Science) (UG)** at its meeting held on 07-01-2023 has recommended the approval of 2nd year Syllabus of **BCA (Hons.) (Cloud Computing & Digital Science)** course in the University of Mysore under specialized/specified programs from the academic year 2023-24 as per NEP-2020 guidelines.

The Faculty of Science & Technology and the Academic Council at their meetings held on 15-03-2023 and 24-03-2023 respectively, have also approved the above proposal and the same is hereby notified.

The syllabus of **BCA (Hons.) (Cloud Computing & Digital Science)** course may be downloaded from the University website <https://uni-mysore.ac.in/PMEB/>.


REGISTRAR
REGISTRAR

University of Mysore
MYSURU - 570 005

To;

1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DoS in Earth Science, Manasagangothri, Mysuru.
3. Prof. D.S. Guru, DoS in Computer Science, Manasagangothri, Mysuru.
4. The Principal, Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, Mysuru.
5. The Deputy Registrar/ Asst. Registrar/ Superintendent, Examination Branch, UOM, Mysuru.
6. The PA to Vice-Chancellor/Registrar/Registrar (Evaluation), University of Mysore, Mysuru.
7. Office Copy.

MG/CS/433/2022-23

Dated: 25/01/2023

Dr. D S Guru

Professor and Chairman

BoS in BCA (Cloud Computing and Digital Science)

To,

1. The Syndicate Section, University of Mysore
2. The Academic Section, University of Mysore
3. The Director, PMEB, University of Mysore

Dear Sir / Madam,

Sub: Submitting proceedings of the BoS meeting in connection with specialized BCA
(Cloud Computing and Digital Science) program.


Ref: Your letter No. PMEB-5/21/Spl./2022-23 dated 27-12-2022.

With reference to the above, I am herewith submitting a copy of the proceedings of the meeting of the members of BoS in BCA (Cloud Computing and Digital Science) along with the recommended list of courses and respective syllabi for your further needful action.

Thanking you,

Also find enclosed list of examiners
approved for your needful (Annexure A)

Sincerely yours


(D S Guru) 25/1/23
Dr. D. S. GURU

M.Sc., Ph.D., PostDoc(US)
Fellow of BOYSCAST(200


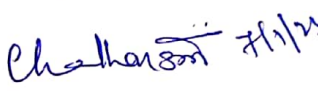

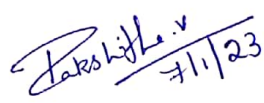
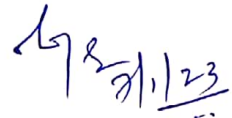
Copy to: The Registrar, University of Mysore, for your Information

Professor
Department of Studies in Computer Science
University of Mysore
Manasagangothri, Mysuru-570 006
Karnataka, INDIA
E-mail: dsg@compsci.uni-mysore.ac.in

Proceedings of the meeting of the members of the Board of Studies in BCA (Cloud Computing and Digital Science) (UG) held on 07-01-2023 at 12.30 PM at the CRESTA First Grade College, Mysuru.

- Ref:** 1. No. UA2/159(4)/2017-2018 dt 18-03-2021
2. No. PMEB-5/21/Spl./2022-23 dt 27-12-2022

With references to the above cited, a meeting of the members of the Board of Studies in BCA (Cloud Computing and Digital Science) has been conducted at the CRESTA First Grade College on Saturday the 07-01-2023 at 12.30 PM. The following members have attended the meeting.

- | | | |
|----------------------------|----------------|--|
| 1. Dr. H N Meenakshi | Member |  |
| 2. Dr. B M Chethana Kumara | Member |  |
| 3. Dr. Rakesh H M | Member |  |
| 4. Ms. Rakshitha V | Invited Member |  |
| 5. Prof. D S Guru | Chairman |  |

The following member were absent for the meeting.

- | | |
|----------------------|--------|
| 1. Sri. S Shreyas | Member |
| 2. Dr. V Vinay Kumar | Member |

The meeting was initiated with a welcome speech by Prof. D S Guru, Chairman of the board. The importance of the meeting was presented along with the agenda of framing the syllabus as per NEP 2020 Regulations for various courses to be offered as part of the existing specialized UG Program called BCA (Hons.) (Cloud Computing and Digital Science). The draft of the restructured scheme, titles of the courses and the respective syllabi for only second year are placed before the members of the board for discussion and suggestions were sought. However, the board has decided to take up preparation of the course titles and respective syllabi for the remaining semesters (5th to 8th Semester) in the next BoS meeting.

After detailed presentation and discussion among the members, the following were resolved to be recommended.

1. This specialized BCA (Hons.) (Cloud Computing and Digital Science) should also be offered under the common NEP 2020 regulations being followed by the University from time to time for the existing general (conventional) BCA program from the academic year 2022-23. The only difference is in the titles of various courses and their respective syllabi offered under DSC, DSE and SEC.
2. The overall number of credits to be earned by the students and the distributions of credits in each semester are exactly on par with the existing general BCA (Hons.) program of the University.
3. The list of the titles of the courses finalized along with respective to syllabi for second year (3rd and 4th Semester) of the program are attached in ANNEXURE – A: BCA (Hons.) (Cloud Computing and Digital Science).
4. The board has resolved to follow the same list of examiners approved for general BCA program for this specialized program also.


Prof. Guru D S

Dr. D. S. GURU

Chairman
M.Sc., Ph.D., PostDoc(USA)
Fellow of BOYSCAST(2005)

Professor
Department of Studies in Computer Science
University of Mysore
Manasagangothri, Mysuru-570 006
Karnataka, INDIA
@compsci.uni-mysore.ac.in

**NOTIFICATION**

Sub: Constitution of the Board of Studies in **BCA (Cloud Computing and Digital Science) (UG)**

Ref: Letter dated 01-03-2021 received from Dr.H.M. Rakesh, Principal, Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, Mysuru.

* * * * *

Pursuant to the approval of the Hon'ble Vice-chancellor and pending approval of the University Syndicate the Board of Studies in **BCA (Cloud Computing and Digital Science) (UG)** is constituted as per the Statutes framed under Section 33 (1) and (2) of the Karnataka State Universities Act 2000, with the following members for a period of **three years** from the date of this notification or until further orders, whichever is earlier.

1.	Prof.D.S. Guru Professor, DOS in Computer Science, Manasagangotri, Mysuru.	Chairman
2.	Dr.H.M.Rakesh Principal, Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, Mysuru - 570 028	Member
3.	Sri.S.Shreyas HOD - Computer Application & Assistant Professor, Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, Mysuru - 570 028	Member
4.	Dr.V.Vinay Kumar Founder Director, IVIS Labs #1608, 5 th Main, 6 th Cross, Vijayanagar 2 nd Stage, Mysuru - 570 017	Member
5.	Dr.B.M.Chethana Kumara Lead Engineer, R & D, Samsung Electro Mechanics 20 th Floor, World Trade Center, Next to Orion Mall, Mallechwaram, Bengaluru - 560 001	Member
6.	Dr.H.N.Meenakshi # 1564, 7 th Cross, 2 nd Stage, Police Layout, Sardar Vallababhai Patel Nagar, T.Narasipura Road, Nadanahalli Post, Mysuru - 570 028	Member

M. J. R. S.
REGISTRAR *6/3/2021*

To:

1. The Concerned Members.
2. Dr.H.M. Rakesh, Principal, Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, Mysuru - 570 028
3. The Dean, Faculty of Science and Technology, University of Mysore, Mysuru
4. The Registrar (Evaluation), University of Mysore, Mysuru.
5. The Finance Officer, University of Mysore, Mysuru.
6. The Director, PMEAB, University of Mysore, Mysuru.
7. The Deputy Registrar/Assistant Registrar/Superintendent (Academic), AB, UOM, Mysuru.
8. P.A. to the Vice-Chancellor/Registrar/Registrar(Evaluation), UOM, Mysuru.
9. The Superintendent, Ph.D Section, Examination Branch, UOM, Mysuru.

ಸಂಖ್ಯೆ: ಪಿ.ಎಂ.ಇ.ಬಿ.-5/21/Spl./2022-23

ದಿನಾಂಕ: 27.12.2022

ಇವರಿಗೆ:

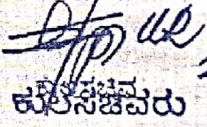
ಅಧ್ಯಯನ ಮಂಡಳಿಯ ಅಧ್ಯಕ್ಷರು/ಸದಸ್ಯರುಗಳು
Specialized Programme
ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು

ಮಾನ್ಯರ,

ವಿಷಯ: ಅಧ್ಯಯನ ಮಂಡಳಿಯ ವಾರ್ಷಿಕ ಸಭೆಯನ್ನು ಏರ್ಪಡಿಸುವ ಬಗೆಗೆ

ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ Specialized Programme ಅಡಿಯಲ್ಲಿ ರಚಿತವಾಗಿರುವ ಅಧ್ಯಯನ ಮಂಡಳಿಗಳು, ವಾರ್ಷಿಕ ಸಭೆಗಳನ್ನು ದಿನಾಂಕ 16.01.2023ರೊಳಗೆ ಏರ್ಪಡಿಸಿ, Specialized Programmeನಡಿ ಮಾನ್ಯತೆ ಪಡೆದ ಕೋರ್ಸ್‌ಗಳ ಪಠ್ಯಕ್ರಮಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ತಮ್ಮ ಶಿಫಾರಸ್ಸುಗಳಿದ್ದಲ್ಲಿ, ಸದರಿ ಶಿಫಾರಸ್ಸುಗಳನ್ನು ಸಭೆಯ ನಡವಳಿ ಪತ್ರದೊಂದಿಗೆ ಈ ಕಛೇರಿಗೆ (ಪಿ.ಎಂ.ಇ.ಬಿ.) ಜರೂರಾಗಿ ಮುಂದಿನ ಕ್ರಮಕ್ಕಾಗಿ ಸಲ್ಲಿಸುವಂತೆ ತಿಳಿಸಲಾಗಿದೆ.

ತಮ್ಮ ವಿಶ್ವಾಸಿ


ಕುಲಸಚಿವರು 2/1/2023

ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಮೈಸೂರು-570 005 4/2/23

ಪ್ರತಿ:

1. Specialized Programme ಅಡಿಯಲ್ಲಿ ಮಾನ್ಯತೆ ಪಡೆದಿರುವ ಸಂಸ್ಥೆಯ ನಿರ್ದೇಶಕರು/ಪ್ರಾಂಶುಪಾಲರುಗಳಿಗೆ
2. ಮಾನ್ಯ ಕುಲಸಚಿವರು/ಕುಲಸಚಿವ (ಪರೀಕ್ಷಾಂಗ)ರವರ ಆಪ್ತ ಸಹಾಯಕರು, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು.
3. ಕಛೇರಿ ಪ್ರತಿ.

NEP 2020 CURRICULUM
Proposed Syllabus for
Bachelor of Computer Applications
(Cloud Computing and Digital Science)

Curriculum for BCA(CC&DS)

Sem	Code	Core Courses	Credit	Hour/Week	
				Theory	Lab
3	CCDS3T1	Python Programming	3	3	
	CCDS3T2	Operating System for CCDS	3	3	
	CCDS3T3	Foundational Mathematics	3	3	
	CCDS3L1	LAB: Python Programming	2		4
	CCDS3L2	LAB: Operating System for CCDS	2		4
4	CCDS4T1	Database Management System	3	3	
	CCDS4T2	Data Representation	3	3	
	CCDS4T3	Cloud Security	3	3	
	CCDS4L1	LAB: Database Management System			4
	CCDS4L2	LAB: Data Representation			4

Table I Course Structure for BCA(CC&DS)

Sem	Course Code	Title of the Paper	Credit	Total Credit of OE, Languages , CAE, Voc, AECC, SEC	Total Credit
3	CCDS3T1	Python Programming	3	13	26
	CCDS3T2	Operating System for CCDS	3		
	CCDS3T3	Foundational Mathematics	3		
	CCDS3L1	LAB: Python Programming	2		
	CCDS3L2	LAB: Operating System for CCDS	2		
4	CCDS4T1	Database Management System	3	13	26
	CCDS4T1	Data Representation	3		
	CCDS4T1	Cloud Security	3		
	CCDS4L1	LAB: Database Management System	2		
	CCDS4L2	LAB: Data Representation	2		

TABLE II: CS COURSE DETAILS FOR BCA(CC&DS)

Course Type	Course Code as referred above	Compulsory/ Elective	List of compulsory courses and list of option of elective courses (A suggestive list)
CA	CCDS1T1, CCDS1T2, CCDS1T3, CCDS2T1, CCDS2T2, CCDS2T3, CCDS3T1, CCDS3T2, CCDS3T3, CCDS4T1, CCDS4T2, CCDS4T3	Compulsory	As Mentioned in Table I
CA E	CAE-1A	Elective	Cyber law and Cyber security Or Advanced Cloud Computing Or Business Intelligence
	CAE-2A	Elective	Cloud Security Or Mobile application development Or Embedded Systems
	CAE-3A	Elective	Data Compression Or IOT Or Data Mining
	CAE-4A	Elective	Open Source Programming Or Pattern recognition Or Automata theory and compiler design
Vocational	Vocational-1	Elective	DTP,CAD and Multimedia Or Hardware and Server Maintenance Or Web Content Management Systems Or Computer Networking Or Healthcare Technologies Or Digital Marketing Or Office Automation
	Vocational-2	Elective	
	Vocational-3	Elective	
	Vocational-4	Elective	
SEC	SEC 1	Compulsory	Health & Wellness/Social & Emotional Learning
	SEC 2	Compulsory	Sports/NCC/NSS etc
	SEC 3	Compulsory	Ethics & Self Awareness
	SEC 4	Compulsory	Professional Communication
	SEC 5	Compulsory	Digital Operational Skill
AECC	AECC1	Compulsory	Environmental Studies
	AECC2	Compulsory	Constitution of India
Language 1	L1-1,L1-2,L1-3,L1-4	Compulsory	Kannada/Functional Kannada
Language 2	L2-1,L2-2,L2-3,L2-4	Elective	English/ Hindi/French/ Additional English/etc.

Computer Application Core Courses(CA C) for BCA (CC&DS) (Hons.)

Sl.No	Course Code	Title of the Paper
1	CCDS3T1	Python Programming
2	CCDS3T2	Operating System for CCDS
3	CCDS3T3	Foundational Mathematics
4	CCDS4T1	Database Management System
5	CCDS4T2	Data Representation
6	CCDS4T3	Cloud Security

Computer Application Electives(CA E) for BCA (CCDS) (Hons)

Sl. No	Computer Application Electives(CA E)
1	Cyber law and Cyber security
2	Advanced Cloud Computing
3	Business Intelligence
4	Cloud Security
5	Mobile application development
6	Embedded Systems
7	Data Compression
8	IOT
9	Data Mining
10	Open Source Programming
11	Pattern recognition
12	Automata theory and compiler design

Vocational Electives

Sl. No	Vocational Electives
1	DTP, CAD and Multimedia
2	Hardware and Server Maintenance
3	Web Content Management System
4	Computer Networking
5	HealthCare Technologies
6	Digital Marketing
7	Office Automation

Syllabus for BCA (CC&DS) (Basic and Hons.) 3rd and 4th Semesters

Semester III

Course Code: CCDS3T1	Course Title: Python Programming
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 02

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Explain basic principles of Python programming language
- Implement object oriented concepts
- Implement database and GUI applications.

Course Content

Content	Hours
Unit - 1	
Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc. Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.	14
Unit - 2	
Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.	14
Unit - 3	
Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas.	14

<p>Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations.</p>	
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Text Book:

1. Charles Dierbach, Wiley: Introduction to Computer Science using Python , 2015
2. Jeeva Jose & P.SojanLal: Introduction to Computing and Problem Solving with PYTHON, Khanna Publishers, New Delhi, 2016.

Reference Books:

1. Wesley J. Chun: Core Python Applications Programming, 3rd Edition , Pearson Education, 2016

Course code : CCDS3L1	Course Title : Python Programming
Course Credits : 02	Hours/Week : 04
Total Contact Hours : 52	Formative assessment marks : 25
Exam Marks : 25	Exam Duration : 03 Hours

Course Objectives (COs):

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

Programming Lab

1. Write a program to demonstrate different number datatypes in python.
2. Write a program to demonstrate different number datatypes in python.
3. Write a program to perform different arithmetic operations on numbers in python.
4. Write a program to perform different arithmetic operations on numbers in python.
5. Write a python program to create an adding machine that will keep on asking the user for numbers, add them together and show the total for each step.
6. Write a Python program to demonstrate break and continue.
7. Write a Python program to insert, remove a specified item using the index from an array. Also perform append operation and check whether the array contains any duplicate elements.
8. Write a python program to Create, Append, Remove and Reverse the list.
9. Write a python program to Implement following using Dictionary
 - a. Insert Name and Phone Number
 - b. Search Phone Number based on Name
 - c. Update Phone Number Based on Name
 - d. Delete Name and Phone Number Based on Name
10. Predict stock price by downloading the tesla dataset from kaggle and use the libraries Sklearn, numpy, Pandas and Matplotlib
11. Online payment fraud detection using pandas and numpy libraries
12. Crypto currency price detection using pandas and Yfinance libraries
13. Stress detection using pandas and numpy libraries

Evaluation Scheme for Lab Examination:

Assessment Criteria	Marks
Writing 2 Programs	10
Execution of 1 Program	10
Viva and Record	05
Total	25

Course code : CCDS3T2	Course Title : Operating System for CCDS
Course Credits : 03	Hours/Week : 03
Total Contact Hours : 42	Formative assessment marks : 40
Exam Marks : 60	Exam Duration : 02

Course Outcomes (Cos) :

After completing this course satisfactorily, a student will be able to:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

Course Content

Content	Hours
Unit-1	
Introduction to operating system Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls. Process Management Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads	14
Unit-2	
Shell scripting , variables, arrays, basic operators, decision making, shell loops, loop control, shell substitutions, quoting mechanisms, I/O redirections, shell functions.	14
Unit-3	
Introduction to virtualized environment , virtual machines, types, features of virtual machines, introduction to clusters, types of clusters, cluster configuration, cluster to set up a server File Management : Types and concepts, NAS Storage.	14

Text Books:

1. Leland L. Beck : System Software , Third edition, Addison Wesley 1997.
2. Abraham Silberschatz and Peter Baer Galvin: Operating System Concepts, Fifth edition, Addison - wesley 1989.
3. Milan Milonkovic: Operating System Concepts & Design, II Edition, McGraw Hill 1992.

References:

1. Operating Systems, Stallings, Pearson Edition.
2. Tanenbaum : Operating System Concepts, Pearson Education.
3. John. J. Donovan : System programming .

Course Code: CCDS3L2	Course Title: Operating System for CCDS
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 03

Course Objective:

After completing this course satisfactorily, a student will be able to:

- To make the students aware of the features and capabilities of Linux so that they can utilize its improved functionalities
- To develop new Linux based software and can also contribute to the development of the operating system itself.

Programming Lab:

1. Demonstrate the Basic Commands in Linux
2. Demonstrate the DC and BC command in Linux
3. Write the shell script to find simple interest
4. Write the shell script to find even and odd
5. Write the shell script to find largest of three number
6. Write the shell script to find factorial of a number
7. Write the shell script to find sum of n number
8. Write the shell script to find Fibonacci series
9. Write the shell script to find pass and percentage of a student
10. Write the shell script to find alphabet, number or special character
11. Write the shell script using arithmetic operation
12. Write the shell script to find the length of given string

Evaluation Schema for Lab Examination:

Assessment Criteria	Marks
Writing 2 Programs	10
Execution of 1 Program	10
Viva and Record	05
Total	25

Course code : CCDS3T3	Course Title : Foundational Mathematics
Course Credits : 03	Hours/Week : 03
Total Contact Hours : 42	Formative assessment marks : 40
Exam Marks : 60	Exam Duration : 02

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Recognize problem solving techniques appropriate to a given situation
- Learn to use of both graphical and numerical methods of problem solving
- Learn statistics for data analysis

Course Content

Content	Hours
Unit-1	
<p>Vector and Vector operations : Definition of vector – types, addition, subtraction and scalar multiplication of vector, properties of addition and subtraction. Position vector</p> <p>Operations: scalar product and vector product, Condition for parallel and perpendicular vectors, properties, angle between two vectors, unit vector perpendicular to two vectors</p> <p>Introduction to vector spaces and subspaces: Definitions, illustrative examples and simple problems. Linearly independent and dependent vectors– definition and problems.</p>	14
Unit-2	
<p>Algebra of matrices: Introduction, Matrix addition and scalar multiplication, Special types of matrices – Symmetric, Skew symmetric and orthogonal matrices, Computation of Inverse and rank of a matrix, Determinates System of linear equations</p> <p>Eigen value and Eigen vector: Computation of Eigen values and Eigen vectors, diagonalizing matrices, Characteristic matrices – Cayley Hamiltonian theorem</p>	14
Unit-3	
<p>Statistics: Definition and scope of Statistics, concepts of statistical population and sample. data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Measures of Central Tendency.</p>	14

Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation. Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials	
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Text Books:

1. Leland L. Beck: System Software , Third edition, Addison Wesley 1997.
2. Abraham Silberschatz and Peter Baer Galvin: Operating System Concepts, Fifth edition, Addison - wesley 1989.
3. Milan Milonkovic: Operating System Concepts & Design, , II Edition, McGRaw Hill 1992.

Reference Books:

1. Murray Spiegel: Vector Analysis, 2nd Edition, Schaum Outline Series.
2. Seymour Lipschutz: Linear Algebra, Schaum Outline Series, Third Edition, McGraw Hill publication.
3. Howard Anton: Elementary Linear Algebra with Supplemental Applications, Schaum Outline Series, 11th Edition.
4. Introduction to Probability and Statistics for Engineers and Scientists – Ross, 5th Edition, Elsevier.
5. K.R Gupta: Mathematical Statistics, First Edition, Atlantic Publishers and Distributor.
6. Gupta and Kapoor: Fundamentals of Mathematical Statistics, 12th Edition, Sultan Chand and Co Publisher.

Semester IV

Course code : CCDS4T1	Course Title : Database Management System
Course Credits : 03	Hours/Week : 03
Total Contact Hours : 42	Formative assessment marks : 40
Exam Marks : 60	Exam Duration : 02

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Explain the various database concepts and the need for database systems
- Identify and define database objects, enforce integrity constraints on a database using DBMS
- Demonstrate a data model and schemas in RDBMS
- Formulate queries in relational algebra, structured query language for database Manipulation
- Explain the transaction processing and concurrency control techniques

Course Content

Content	Hours
Unit-1	
Introduction to Database: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples.	14
Unit - 2	
Relational Model: Anomalies in relational database design, Relational Model Concepts, Characteristics of Relation, Relational Model Constraints and Relational Database Schemas. Relational Algebra: Unary Relational Operator: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION.	14
SQL : SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	

Unit - 3	
<p>Data Normalization: Anomalies in relational database design, Functional dependencies, Decomposition, First, Second, third and Boyce Codd Normal Forms</p> <p>Query Processing Transaction Management: Introduction Transaction Processing. Single User and Multiuser Systems. Transactions: read and write operations. Need of Concurrency Control the Lost Update Problem, Dirty Read Problem. Types of failure. Transaction states. Desirable properties(ACID Properties) of Transactions.</p>	14

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe : Fundamentals of Database Systems, 7th Edition, 2017, Pearson.
2. Ramakrishnan, and Gehrke: Database management systems, 3rd Edition, 2014, McGraw Hill

Reference Books:

1. Silberschatz Korth and Sudharshan: Database System Concepts,6th Edition, Mc-GrawHill, 2013.
2. Coronel, Morris, and Rob: Database Principles Fundamentals of Design, Implementation and Management , Cengage Learning 2012

Course code : CCDS4L1	Course Title : Database Management System
Course Credits : 02	Hours/Week : 04
Total Contact Hours : 52	Formative assessment marks : 25
Exam Marks : 25	Exam Duration : 03

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Execute a single line query and group functions.
- Execute DDL Commands.
- Execute DML Commands
- Execute DCL and TCL Commands.
- Implement the Nested Queries.
- Implement Join operations in SQL
- Create views for a particular table
- Implement Locks for a particular table

Programming Lab:

Activity 1:

Database: Student (DDL, DML Statements)

Table: Student

Name	RegNo	Class	Major
Smith	17	1	CS
Brown	8	2	CS

Table: Course

Course Name	Course Number	Credit Hours	Department
Introduction to Computer Science	CS1310	4	CS
Data Structure	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database Management Systems	CS3380	3	CS

Table: Section

Section_Identifier	CourseNumber	Year	Instructor
85	MATH2410	98	King
92	CS1310	98	Andreson
102	CS3320	99	Knuth
112	MATH2410	99	Chang
119	CS1310	99	Andreson
135	CS3380	99	Stone

Table: Grade_Report

RegNo	Section_Identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

1. Create Tables using create statement
2. Insert rows to individual tables using insert statement
3. Alter table section add new field section and update the records
4. Delete brown's grade report
5. Drop the table section

Activity 2: (Select clause, Arithmetic Operators)

Database: Employee

Create Following **tables** and insert **tuples** with suitable constraints.

Table: Employee

Emp_Id	First_Name	Last_Name	Hire_Date	Address	City
1001	George	Smith	11-May-06	83 first street	Paris
1002	Mary	Jones	25-Feb-08	842 Vine Ave	Losantiville
1012	Sam	Tones	12-Sep-05	33 Elm St.	Paris
1015	Peter	Thompson	19-Dec-06	11 Red Road	Paris
1016	Sarath	Sharma	22-Aug-07	440 MG Road	New Delhi
1020	Monika	Gupta	07-Jun-08	9 Bandra	Mumbai

Table : Empsalary

Emp_Id	Salary	Benefits	Designation
1001	10000	3000	Manager
1002	8000	1200	Salesman
1012	20000	5000	Director
1015	6500	1300	Clerk
1016	6000	1000	Clerk
1020	8000	1200	Salesman

Write queries for the following

1. To display FIRSTNAME, LASTNAME, ADDRESS AND CITY of all employees living in PARIS.
2. To display the content of employee table in descending order of FIRSTNAME
3. Select FIRSTNAME and SALARY of salesman

4. To display the FIRSTNAME, LASTNAME, AND TOTAL SALARY of all employees from the table EMPLOYEE and EMPSALARY. Where TOTAL SALARY is calculated as SALARY+BENEFITS
5. Count number of distinct DESINGATION from EMPSALARY
6. List the employees whose names have exactly 6 characters
7. Add new column PHONE_NO to EMPLOYEE and update the records
8. List employee names, who have joined before 15-Jun-08 and after 16-Jun-07

Activity 3: (Logical, Relational Operators)

Database: Library

Create Following **tables** and insert **tuples** with suitable constraints

Table: Books

Book_Id	Book_Name	Author_Name	Publishers	Price	Type	Quantity
C0001	The Klone and I	Lata Kappor	EPP	355	Novel	5
F0001	The Tears	William Hopkins	First Publ	650	Fiction	20
T0001	My First C++	Brain & Brooke	ERP	350	Text	10
T0002	C++ Brainwork"s	A.W.Rossaine	TDH	350	Text	15
F0002	Thunderbolts	Ana Roberts	First Publ.	750	Fiction	50

Table: Issued

Book_Id	Quantity_Issued
T0001	4
C0001	5
F0001	2
T0002	5
F0002	8

Write queries for the following

1. To show Book name, Author name and price of books of **First Publ.** publisher
2. Display Book id, Book name and publisher of books having quantity more than 8 and price less than 500
3. Select Book id, book name, author name of books which is published by other than ERP publishers and price between 300 to 700
4. Generate a Bill with Book_id, Book_name, Publisher, Price, Quantity, 4% of VAT "Total".
5. Display book details with book id"s C0001, F0001, T0002, F0002 (Hint: use IN operator)
6. Display Book list other than, type Novel and Fiction
7. Display book details with author name starts with letter „A“
8. Display book details with author name starts with letter „T“ and ends with „S“
9. Select Book_Id, Book_Name, Author Name , Quantity Issued where Books.Books_Id = Issued.Book_Id

10. List the book_name, Author_name, Price. In ascending order of Book_name and then on descending order of price.

Activity 4: (Date Functions)

Database: Lab

Create Following table and insert tuples with suitable constraints

Table: Equipment_Details

No.	ItemName	Costperitem	Quantity	Dateofpurchase	Warranty	Operational
1	Computer	30000	9	21/5/07	2	7
2	Printer	5000	3	21/5/06	4	2
3	Scanner	8000	1	29/8/08	3	1
4	Camera	7000	2	13/6/05	1	2
5	UPS	15000	5	21/5/08	1	4
6	Hub	8000	1	31/10/08	2	1
7	Plotter	25000	2	11/1/09	2	2

(Numeric, character functions) Use Functions for the following

1. To select the ItemName purchase after 31/10/07
2. Extend the warranty of each item by 6 months
3. Display ItemName , Dateof purchase and number of months between purchase date and present date
4. To list the ItemName in ascending order of the date of purchase where quantity is more than 3.
5. To count the number, average of costperitem of items purchased before 1/1/08
6. To display the minimum warranty , maximum warranty period
7. To Display the day of the date , month , year of purchase in characters
8. To round of the warranty period to month and year format.
9. To display the next Sunday from the date "07-JUN-96"
10. To list the ItemName, which are within the warranty period till present date

Activity 5:

Database: Subject

Create Following **table** and insert **tuples** with suitable constraints

Table - Physics

Regno	Name	Year	Combination
AJ00325	Ashwin	First	PCM
AJ00225	Swaroop	Second	PMCs
AJ00385	Sarika	Third	PME
AJ00388	Hamsa	First	PMCs

Table – Computer Science

Regno	Name	Year	Combination
AJ00225	Swaroop	Second	PMCs
AJ00296	Tajas	Second	BCA
AJ00112	Geetha	First	BCA
AJ00388	Hamsa	First	PMCs

1. Select all students from physics and Computer Science
2. Select student common in physics and Computer Science
3. Display all student details those are studying in second year
4. Display student those who are studying both physics and computer science in second year
5. Display the students studying only physics
6. Display the students studying only Computer Science
7. select all student having PMCs combination
8. select all student having BCA combination
9. select all student studying in Third year
10. Rename table Computer Science to CS

Activity 6: (views)

Database: Railway Reservation System

Create Following **table** and insert **tuples** with suitable constraints

Table: Train Details

Train_No	Train_Name	Start_Place	Destinatio n
RJD16	Rajdhani Express	Bangalore	Mumbai
UDE04	Udhyan Express	Chennai	Hyderabad
KKE55	Karnataka Express	Bangalore	Chennai
CSE3	Shivaji Express	Coimbatore	Bangalore
JNS8	Janashatabdi	Bangalore	Salem

Table: Availability

Train_No	Class	Start_Place	Destination	No_of_seats
RJD16	Sleeper Class	Bangalore	Mumbai	15
UDE04	First Class	Chennai	Hyderabad	22
KKE55	First Class AC	Bangalore	Chennai	15
CSE3	Second Class	Coimbatore	Bangalore	8
JNS8	Sleeper Class	Bangalore	Salem	18

1. Create view **sleeper** to display train no, start place, destination which have sleeper class and perform the following
 - i. insert new record
 - ii. update destination="Manglore" where train no="RJD16"
 - iii. delete a record which have train no="KKE55"
2. Create view **details** to display train no, train name, class
3. Create view **total_seats** to display train number, start place, use count function to no of seats ,group by start place and perform the following
 - iv. insert new record
 - v. update start place="Hubli" where train no="JNS8"
 - vi. delete last row of the view
4. Rename view sleeper to class
5. Delete view details

Activity 7: (group by, having clause) Database: Bank system

Create Following **table** and insert **tuples** with suitable constraints

Table: Account

Account_No	Cust_Name	Brach_ID
AE0012856	Reena	SB002
AE1185698	Akhil	SB001
AE1203996	Daniel	SB004
AE1225889	Roy	SB002
AE8532166	Sowparnika	SB003
AE8552266	Anil	SB003
AE1003996	Saathwik	SB004
AE1100996	Swarna	SB002

Table: Branch

Branch_ID	Branch_Name	Branch_City
SB001	Malleswaram	Bangalore
SB002	MG Road	Bangalroe
SB003	MG Road	Mysore
SB004	Jainagar	Mysore

Table: Depositor

Account_No	Branch_Id	Balance
AE0012856	SB002	12000
AE1203996	SB004	58900
AE8532166	SB003	40000
AE1225889	SB002	150000

Table: Loan

Account_No	Branch_Id	Balance
AE1185698	SB001	102000
AE8552266	SB003	40000
AE1003996	SB004	15000
AE1100996	SB002	100000

1. Display Total Number of accounts present in each branch
2. Display Total Loan amount in each branch
3. Display Total deposited amount in each branch by descending order
4. Display max , min loan amount present in each city.
5. Display average amount deposited in each branch , each city
6. Display maximum of loan amount in each branch where balance is more than 25000
7. Display Total Number of accounts present in each city
8. Display all customer details in ascending order of brachid
9. Update Balance to 26000 where accno=AE1003996
10. Display Customer Names with their branch Name

Evaluation Schema for Lab Examination:

Assessment Criteria	Marks
Writing 2 Programs	10
Execution of 1 Program	10
Viva and Record	05
Total	25

Course code : CCDS4T2	Course Title : Data Representation
Course Credits : 03	Hours/Week : 03
Total Contact Hours : 42	Formative assessment marks : 40
Exam Marks : 60	Exam Duration : 02

Course Outcomes (CO's) :

After completing this course satisfactorily, a student will be able to:

- Obtain, clean/process, and transform data
- Analyze and interpret data using an ethically responsible approach
- Use appropriate models of analysis, assess the quality of input, derive insight from Results
- Will be able to structure the unstructured data

Course Content

Content	Hours
Unit-1	
Introduction to Data: Types of Data, Data Extraction, Cleanup, and Transformation Tools –Metadata, Data Mining Functionalities, Interestingness of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Data Warehouse , Issues.	14
Unit-2	
Introduction to Data Representation and schemes: Types of Representation schemes – Tabular, Knowledge-graph; Data Representation Tools. Data Normalization; Data Scaling; Data Visualization – concepts and tools.	14
Unit-3	
Introduction to Data Analysis, Univariate and Multi-variate data analysis; Data Covariance; Data Correlation – concepts and tools; Dimensionality Reduction – Feature selection [Filter and Wrapper] and feature transformation [PCA & LDA]	14

References :

1. Jean Paul Isson : Unstructured Data analysis, wiley,2018

Course code : CCDS4L1	Course Title : Data Representation
Course Credits : 02	Hours/Week : 04
Total Contact Hours : 52	Formative assessment marks : 25
Exam Marks : 25	Exam Duration : 03

Course Objective:

The course should enable the students to:

- Learn pre-processing method for multi-dimensional data
- Practice on data cleaning mechanisms
- Learn various data exploratory analysis
- Develop the visualizations for clusters or partitions

Programming Lab:

1. DATA PRE-PROCESSING AND DATA CUBE
 - a. Data preprocessing methods on student and labor datasets Implement datacube for data
 - b. warehouse on 3-dimensional data
2. DATA CLEANING
 - a. Implement various missing handling mechanisms, Implement various noisyhandling
 - b. mechanisms
3. Write a Python program to do the following operations:
 - a. Create multi-dimensional arrays and find its shape and dimension
 - b. Create a matrix full of zeros and ones
 - c. Reshape and flatten data in the array
 - d. Append data vertically and horizontally
 - e. Apply indexing and slicing on array
 - f. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation
4. Write a Python program to do the following operations:
 - a. Dot and matrix product of two arrays
 - b. Compute the Eigen values of a matrix
 - c. Solve a linear matrix equation such as $3 * x^0 + x^1 = 9$, $x^0 + 2 * x^1 = 8$
 - d. Compute the multiplicative inverse of a matrix
 - e. Compute the rank of a matrix
 - f. Compute the determinant of an array
5. Write a Python program to do the following
 - a. Loading data from CSV file
 - b. Compute the basic statistics of given data - shape, no. of columns, mean

- c. Splitting a data frame on values of categorical variables
 - d. Visualize data using Scatter plot
6. Write a python program to load the dataset and understand the input data
 - a. Load data, describe the given data and identify missing, outlier data items
 - b. Find correlation among all attributes
 - c. Visualize correlation matrix
 7. Write a python program to impute missing values with various techniques on given dataset.
 8. Remove rows/ attributes
 9. Replace with mean or mode
 10. Write a python program to perform transformation of data using Discretization (Binning) and normalization (MinMaxScaler or MaxAbsScaler) on given dataset.
 11. Write a python program by using NumPy std() method to find the standard deviation.
 12. Write a python program to do the following:
 - a. Mean
 - b. Mode
 - c. Median
 13. Write a Python program to explain the working of feature scaling on the data.

Evaluation Schema for Lab Examination:

Assessment Criteria	Marks
Writing 2 Programs	10
Execution of 1 Program	10
Viva and Record	05
Total	25

Course code : CCDS4T3	Course Title : Cloud Security
Course Credits : 03	Hours/Week : 03
Total Contact Hours : 42	Formative assessment marks : 40
Exam Marks : 60	Exam Duration : 02

Course Outcomes (CO's) :

After completing this course satisfactorily, a student will be able to:

- Understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.
- Understand various types of transmission media, network devices; and parameters evaluation of performance for each media and device.
- Understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.
- Understand the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.

Course Content

Content	Hours
Unit-1	
Cloud Computing Fundamentals- Definition, Evolution, Essential characteristics, Cloud Deployment Models, Cloud Service Models, Benefits, Cloud Architecture, Virtualization in Cloud, Cloud Data Centre, SLA, Cloud Applications.	14
Unit-2	
Cloud Security Challenges, Cloud Information Security Objectives, Cloud Security Services, Secure Cloud Software Requirements, Cloud Security Policy Implementation, Infrastructure Security, Data Security and Storage, Privacy in Cloud.	14
Unit-3	
Threats and Vulnerabilities to Infrastructure, Data, and Access Control; Risk Management and Risk Assessment in Cloud, Cloud Service Provider Risks, Virtualization Security Management in the Cloud, Trusted Cloud Computing, Identity Management and Access Control.	14

References:

1. Ronald L. Krutz, Russell Dean Vines : Cloud Security: A Comprehensive Guide to secure cloud computing, Wiley Publishing, 2010.
2. Tim Mather, Subra Kumaraswamy and Shahed Latif : Cloud Security and Privacy, published by O'Reilly Median, Inc., 2009