



Shri Vaishnav Vidyapeeth Vishwavidyalaya

B.Tech.(CSE-Big Data Analytics/Cloud and Mobile Computing/Artificial Intelligence-IBM)

Choice Based Credit System (CBCS) 2018-19

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
ML301	UG	Environment and Energy Studies	3	0	0	3	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The students will be able to:

1. To understand sources of information required for addressing environmental challenges.
2. To identify a suite of contemporary tools and techniques in environmental informatics.
3. To apply literacy, numeracy and critical thinking skills to environmental problem-solving.

Course Outcomes:

The students should be able to:

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Syllabus:

UNIT I

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

UNIT II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.

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UNIT III

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

UNIT IV

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man/wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National biodiversity act.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP).

Text Books:

1. Agarwal, K.C.,(latest edition).**Environmental Biology**, Bikaner :Nidi Pub. Ltd.
2. Brunner R.C.(latest edition) **Hazardous Waste Incineration**, McGraw Hill Inc.
3. Clank R.S. ,(latest edition. **Marine Pollution**, Clarendon Press Oxford (TB).
4. De A.K(latest edition) **Environmental Chemistry**, Wiley Western Ltd.
5. ErachBharucha(2005).**Environmental Studies for Undergraduate Courses** by for University Grants Commission.

Reference Books:

1. R. Rajagopalan(2006).**Environmental Studies**. Oxford University Press.
2. M. AnjiReddy(2006).**Textbook of Environmental Sciences and Technology**. BS Publication.
3. Richard T. Wright(2008).**Environmental Science: towards a sustainable future** PHL Learning Private Ltd. New Delhi.
4. Gilbert M. Masters and Wendell P. Ela.(2008).**Environmental Engineering and science**. PHI Learning Pvt Ltd.
5. Daniel B. Botkin& Edwards A. Keller(2008).**Environmental Science** Wiley INDIA edition.
6. AnubhaKaushik(2009).**Environmental Studies**. New age international publishers.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIT502	UG	Computer Networks	3	1	2	5	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student should be made to:

1. Understanding the fundamental concepts of computer networking.
2. Creating students interest in the basic taxonomy and terminology of the computer networking area.
3. Applying advanced networking concepts for student knowledge.
4. Creating the student for entry Advanced courses in computer networking.

Course Outcomes:

Upon completion of the subject, students will be able to:

1. Understanding basic computer network technology.
2. Understanding and explain Data Communications System and its components.
3. Evaluating the different types of network topologies and protocols.
4. Remembering the layers of the OSI model and TCP/IP.
5. Evaluating the different types of network devices and their functions within a network.

Syllabus:

UNIT I

Computer Network: Definitions, Goals, components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, TCP/IP model overview, Descriptions of various layers and its comparison with TCP/IP. Network standardization.

UNIT II

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Bit oriented protocols: SDLC, HDLC, BISYNC, LAP and LAPB.

UNIT III

MAC Sublayer: Overview of MAC Layer, MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), CSMA/CA, CSMA/CD Ethernet, token bus, token ring, (IEEE 802.3, IEEE 802.4, IEEE 802.5, IEEE 802.11 wireless Communication.

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SEMESTER IV

UNIT IV

Network Layer: Need, Services Provided, Design issues, Routing and congestion in network layer, wired & wireless routing protocol examples, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multi cast Routing. IP protocol, IP Addresses, subnetting, Comparative study of IPv4 & IPv6, Mobile IP.

UNIT V

Transport Layer: Overview, Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management. **Session layer:** Overview, Authentication, Session layer protocol. **Presentation layer:** Overview, Data conversion, Encryption and Decryption, Presentation layer protocol (LPP, Telnet, X.25 packet Assembler/Disassembler). **Application Layer:** Overview, WWW and HTTP, FTP, SSH.

Text Books:

1. Andrew S Tanenbaum, Computer Networks, 6th Edition, Pearson Education, 2016.
2. Behrouz A.Forouzan, TCP/IP-Protocol suite, 4th edition, McGraw-Hill, 2010.
3. William Stallings, Data and Computer Communication, 10th edition Pearson, 2014.
4. Comer, Internet working with TCP/IP Volume one, Addison-Wesley, 2015.
5. W. Richard Stevens, TCP/IP Illustrated, Volume 1, 2nd Edition Addison-Wesley Professional Computing Series.

Reference Books:

1. Kaveh Pahlavan, Prashant Krishnamurthy, Networking Fundamentals, Wiley Publication,2009.
2. Michael A. Gallo & William M. Hancock, Computer Communications & Networking Technologies, Cengagepearson publications, 2001.
3. Dimitri Bertsekas, Robert Gallager, Data Networks, PHI Publication, Second Edition, 1992.
4. Uyles Black, Computer Networks, PHI Publication, Second Edition, 1993.

List of Practical:

1. Demonstrate Different Types of Network Equipment's.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.
4. Experiment with basic network command and Network configuration commands.
5. Examine network IP.
6. Write a program to implement various types of error correcting techniques.
7. Write a program to implement various types of farming methods.
8. Implement & simulate various types of routing algorithm.
9. Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks.
10. Simulate STOP AND WAIT Protocols on NS-2.
11. Simulate various Routing Protocol on NS-2.
12. Simulate various Network Topologies on NS-2.
13. Configuring routers, bridges and switches and gateway on NS-2.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCS502	UG	Operating System	2	1	2	4	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. To learn the fundamentals of Operating Systems.
2. To study the mechanisms of Operating System to handle processes and threads and their communication.
3. To gain knowledge of process management concepts that includes architecture, Mutual exclusion algorithms, deadlock detection and recovery algorithms.
4. To learn the mechanisms involved in memory management in Operating System.
5. To know the components and management aspects of disc scheduling.

Course Outcomes:

Upon completion of the subject, students will be able to:

1. To describe the detail structure of Operating System.
2. To design and Implement Process management Techniques in Operating System.
3. To calculate CPU Scheduling criteria.
4. To understand The Memory Management of Operating System.
5. To elaborate Disc Scheduling.

Syllabus:

UNIT I

Introduction to Operating System: Introduction and Need of operating system, Layered Architecture/Logical Structure of Operating system, Type of OS(Multiprogramming , Time Sharing, Real Time ,Networked, Distributed, Clustered, Hand Held), Operating system as Resource Manager and Virtual Machine, OS Services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.

UNIT II

Process Management: Process Model, Creation, Termination, States & Transitions, Hierarchy, Context Switching, Process Implementation, Process Control Block, Basic System calls- Linux & Windows. Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling

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UNIT III

Interprocess Communication: Introduction to Message Passing, Race Condition, Critical Section Problem, Peterson's Solution, Semaphore, Classical Problems of Synchronization Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, Sleeping Barber Problem etc. **Deadlock-** System model, Resource types, Deadlock Problem, Deadlock Characterization, Methods for Deadlock Handling, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock Detection, Recovery from Deadlock.

UNIT IV

Memory Management: concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit and quick fit. Free space management- bitmap, link list/free list.

Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, FIFO, LRU; Belady's anomaly; TLB (translation look aside buffer).

UNIT V

File Management: Concepts, Naming, Attributes, Operations, Types, Structure, File Organization & Access (Sequential, Direct, Index Sequential) Methods, Memory Mapped Files, Directory Structures One Level, Two Level, Hierarchical/Tree, Acyclic Graph, General Graph, File System Mounting, File Sharing, Path Name, Directory Operations, Overview Of File System in Linux & Windows.

Input/output Subsystems- Concepts, Functions/Goals, Input/Output devices- Block And Character, Spooling, Disk Structure & Operation, Disk Attachment, Disk Storage Capacity, Disk Scheduling Algorithm- FCFS, SSTF, Scan Scheduling, C-Scan Schedule.

Text books:

1. Abraham Silberschatz, "Operating system concepts", 10th Edition, John Wiley & Sons. INC, 2018
2. Andrew S. Tannenbaum, "Modern operating system", 4th Edition, Pearson Education, 2014
3. Dhananjay M. Dhamdhere, "Operating Systems: A concept Based Approach", 3rd Edition TMH, 2017,
4. Sibsankar Haldar, Alex Alagarsamy Aravind, "Operating System", 8th Edition, Pearson Education India,, 2010

Reference Books:

1. Achyut S Godbole, "Operating System", 3rd TMH, 2017.
2. William Stallings, "operating system" 8th, Pearson Education, ,2014.
3. Vijay Shukla, "Operating System", 3rd, Kataria & Sons, 2013.
4. Singhal & Shrivatri, "Advanced Concept in Operating Systems", 1st, Tata Mc-Graw Hill Education, edition 2017.

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List of Practical:

1. Implement and update the BIOS settings of your PC.
2. If there are 5 printers are connected in a system each process to print will take different time to complete, and CPU will give a fixed time to each process after that deadline next process will enter in CPU. If a problem not completed in a given slot then that process will be re-enter as per the FCFS, on rotation basis? Apply the scheduling on this?
3. Implement Non Preemptive Priority CPU Scheduling.
4. Implement Non Preemptive Shortest Job first CPU Scheduling.
5. If there are 5 different resources like 3 printer,2 scanner are connected to a system each taking different time to complete the task. Which scheduling is best and gives best performance of CPU?
6. Implement the scheduling for that where CPU give chance to complete those process first which comes first?
7. Implement Round-Robin CPU scheduling.
8. Write a program to implement Semaphore.
9. Find the solution for the situation where 5 faculties are sitting in a round table. There are 4 ball pens are placed on this table. At a time only one pen can be picked by one faculty to writing work. What will happen if all picked the pen for writing simultaneously?
10. Find the solution for dentist checkup clinic where only one chair and one dentist is available for treatment. And having n chairs to waiting for patient.
 - If there is no patient, then the doctor sleeps in his own chair.
 - When a patient arrives, he has to wake up the doctor.
 - If there are many patients and the doctor is doing treatment of him, then the remaining patients either wait if there are empty chairs in the waiting room or they leave if no chairs are empty.
11. Write a program for Memory Management Algorithms e.g. First Fit, Best Fit, Worst Fit.
12. Demonstrate Virtual memory Techniques like, LRU, FIFO etc.
13. Implement Shortest Seek Time First Disk Scheduling Algorithm.
14. Implement Scan Scheduling Disk Scheduling Algorithm.
15. Implement Circular Scan Disk Scheduling Algorithm.
16. Implement Look Disk Scheduling Algorithm.

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCSI405	UG	Data Base Management System	3	1	2	5	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

The student will have ability to:

1. To understand the dissimilar issues concerned in the intend and implementation of a database system.
2. To learn the physical and logical database design, database modelling, relational, hierarchical, and network models
3. To understand and develop data manipulation language to query, modernize, and manage a database
4. To expand an understanding of necessary DBMS concepts such as: database security, integrity, concurrency,
5. To intend and build a straightforward database system and show competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

Course Outcomes:

Upon completion of the subject, students will be able to:

1. Evaluate business information problem and find the requirements of a problem in terms of data.
2. Understand the uses the database schema and need for normalization.
3. Design the database schema with the use of appropriate data types for storage of data in database.
4. Use different types of physical implementation of database
5. Use database for concurrent use.
6. Backup data from database.

Syllabus: To be continue from Next Page

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IBM CE – Information Management Basics using DB2

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IBM CE – Information Management Basics using DB2

Module overview

1. Installation and Planning

After completing this unit, you should be able to:

- Install DB2 Universal Database and DB2 Clients & Developer's Edition
- Describe and use the DB2 UDB GUI tools and Command Line Processor
- Explain the concepts of data warehousing and OLAP issues
- Describe the DB2 tools

2. Data Modeling & Data Design

After completing this unit, you should be able to:

- State the purpose of a business model
- Identify an Entity-Relationship Diagram model (ERD)
- List several DB2 column data types
- Identify non-standard column and table names
- Identify the characteristics of a primary and foreign key
- State the purpose of referential integrity
- State the purpose of triggers

3. Relational Databases

After completing this unit, you should be able to:

- Identify the components of tables
- Explain the guidelines defined by the relational data model pertaining to:
 - The uniqueness of rows and columns
 - The physical ordering of rows and columns
 - The linkage of tables
- Understand the advantages of a relational database
- Define a RELATION
- Name the language used to 'talk' to a relational database manager (RDBM)
- List three characteristics assigned to each column
- Define the tasks performed by DB2 when running an application
- Define the roles that are performed within DB2

4. Database Query Languages

After completing this unit, you should be able to:

- Simple SQL Queries
 - Describe four SELECT statement clauses (SELECT, FROM, WHERE, ORDER BY) and their purpose
 - Retrieve all rows of a table
 - Retrieve specific columns
 - Retrieve rows based on comparisons to numeric or alphanumeric column values
 - Use the keywords BETWEEN, IN, LIKE, DISTINCT
 - Order the resulting rows in a desired sequence
- Retrieving Data from Multiple Tables
 - Retrieve data from more than one table or view
 - Specify JOIN predicates
 - Use correlation names in queries
- Scalar Functions and Arithmetic
 - Use arithmetic in the SELECT and WHERE clauses
 - Specify basic scalar functions such as COALESCE/VALUE, DECIMAL, SUBSTR
 - Use date and time scalar functions
 - Use the CONCAT operator

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- a. Column Functions and Grouping
 - i. Describe the difference between scalar and column functions
 - ii. List the more common DB2 UDB column functions
 - iii. Group rows into sets based on one or more columns
- b. Union
 - i. Produce a single result table containing data from more than one query
 - ii. State the UNION rules
 - iii. State the difference between UNION and UNION ALL
- c. Using Sub-queries
 - i. Use sub-queries in WHERE and HAVING clauses
 - ii. Code sub-queries using basic predicates
 - iii. Code sub-queries using the IN keyword

5. Relational Database Design

After completing this unit, you should be able to:

- a. Views and results during DB design
 - i. Explain the different views assumed for the data during database design
 - The conceptual view
 - The storage view
 - The logical view
 - ii. Summarize the steps performed during database design and their results
 - iii. Relate the steps and results to the data views
- b. Problem Statement
 - i. Explain the purpose of the problem statement for database design
 - ii. Understand who has the responsibility for the creation of the problem statement
 - iii. Describe the role of the database designer in the creation of the problem statement
 - iv. Describe the contents of a problem statement
- c. Entity-Relationship Model
 - i. Define the entity types for an application domain based on a problem statement
 - ii. Define the relationship types for an application domain based on a problem statement
 - iii. Define the supertypes and subtypes for an application domain
 - iv. Identify the constraints for the entity types and relationship types of an application domain
 - v. Establish an entity-relationship model for an application domain
- d. Data and Process Inventories
 - i. Explain the purpose of data and process inventories
 - ii. Explain the significance of data inventories for database design
 - iii. Understand who has the responsibility for the creation of data and process inventories
 - iv. Describe the content data and process inventories should have for database design
 - v. Summarize some methods for establishing data and process inventories

Up to now, from the problem statement, the entity-relationship model for the application domain has been developed. To develop the corresponding database, you must determine the data that should be contained in the database before you can proceed. This means that you must establish a list of all data for the application domain, that is, the data inventory.

In this unit, we will talk about the data inventory and the process inventory which is interrelated with it. We will describe their purposes and explain the significance of the data inventory for database design. You will find out whose responsibility it is to establish the data and process inventories for the application domain.



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In addition, you will learn what the content of data and process inventories should be from the perspective of database design. The process inventory is primarily intended for application programmers, but is important for database design: The descriptions of its business processes reveal the data that should be contained in the database for the application domain.

e. Tuple Types

- i. Explain the purpose of tuple types and position them in the design process
- ii. Identify the objects of an ER model for which tuple types are established
- iii. Establish the tuple types for the appropriate objects of an ER model
- iv. Explain the purpose and rules for the normalization of tuple types
- v. Normalize the tuple types for an application domain

Up to now, the entity-relationship model and the data and process inventories for the application domain have been established. Now, it is time to transform the information collected so far into objects that are machine processable. This requires a sequence of steps. The first step is to establish the tuple types for the application domain and to normalize them.

In this part of the unit, we will talk about the purpose of tuple types, describe for which objects of the entity-relationship model they are established, and how they are established.

The tuple types established this way may contain anomalies and redundant information and are submitted to a process called Normalization. We will talk about the purpose of normalization and Normal Forms.

Thus, after the completion of this part of the unit, you should be able to establish the tuple types for an application domain and to normalize them.

f. From Tuple Types to Tables

- i. Combine tuple types to reduce the number of tables required
- ii. Split tuple types to cope with database limitations or performance degradations
- iii. This section of the unit deals with the establishment of the tables for the target database management system. The tables are the containers for the data of the application domain. Thus, we are right in the heart of physical design, i.e., of the storage view.
- iv. Describe the different types of integrity to be enforced for a database
- v. Explain the integrity rules for referential integrity
- vi. Establish the referential constraints for the tables of an application domain
- vii. Draw the referential structure for the tables of an application domain
- viii. Know how to ensure the integrity of redundant information
- ix. Implement business constraints-
- x. This unit discusses the different types of integrity that must be enforced for a database. They are:
 - Referential integrity
 - Domain integrity
 - Redundancy integrity
 - Constraint integrity

The unit will describe: the integrity rules that can be enforced to achieve referential integrity; how the referential constraints can be implemented; and how to establish the referential structure for an application domain. The referential structure provides a graphical overview of the referential constraints. It will not discuss domain integrity in detail since it has been discussed by the previous unit. It will discuss how the integrity of redundant information can be achieved. Furthermore, the unit will explain how constraint

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- g. Indexes
- integrity can be enforced, i.e., how the business constraints for an application domain can be implemented
- Describe the basic structure of indexes
 - Explain the various options for indexes
 - Describe for which columns you should establish indexes

Conceptually, the tables established can be implemented without indexes. However, in this case, accessing a row may mean searching the entire table for the row and may be very time-consuming and expensive. Indexes present a means for directly accessing specific rows and are needed to ensure performance. In this unit, we will describe the basic structure of indexes and demonstrate how they are used for directly accessing a row. Furthermore, we will talk about various options for (forms of) indexes such as unique or non-unique indexes.

In addition, we will discuss for which columns, from a database design perspective, you should establish indexes. We will not talk about the usage of indexes from the business-process perspective. The requirements of the business processes for indexes depend on their usage patterns and may change in the course of time. Therefore, indexes for business processes should be established as and when needed and dropped when they are no longer needed. The database management systems generally provide means for analyzing queries to determine the need for and effectiveness of indexes.

- h. Logical Data Structure
- Explain the purpose of logical data structures
 - Understand who has the responsibility for the establishment of logical data structures
 - Describe the components of logical data structures and their representation
 - Explain the relationship between business processes and logical data structures
 - Describe the interrelationship between logical data structures and views
 - After having established the tables, integrity rules, and indexes for the application domain, we must make the transition from storage view to logical view. The transition verifies the design of the database and proves that it meets the requirements of the business processes. The verification is accomplished by establishing the logical data structures for the business processes described in the process inventory. This unit describes logical data structures and briefly discusses views which complement them. It describes:
 - The purpose of logical data structures.
 - Who is responsible for establishing the logical data structures for the business processes and the role of the database designer.
 - The components of logical data structures and how they are represented.
 - The relationship between the business processes and logical data structures.
 - The interrelationship between logical data structures and views. Views are relational database objects describing subsets and combinations of one or more tables.

6. Distributed Databases

After completing this unit, you should be able to:

- a. Distributed Data
- List several planning considerations for distributing data
 - List some of the skills required to successfully distribute data
 - Differentiate between remote unit of work, distributed unit of work, and distributed request

7. Physical Database Design

After completing this unit, you should be able to:

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- i. Physical Implementation
 - ii. Explain the built in data types
 - iii. Establish the tables for the tuple types including:
 - The translation of abstract data types for attributes
 - The definition of data types and column attributes for the columns of the tables
 - iv. Implement abstract data types
 - Explain user defined distinct types
 - Explain user defined functions
 - Discuss the purpose of check expressions
 - Explain the different triggers
- a. Intermediate SQL
- i. Create objects
 - ii. Use a variety of table joins
 - iii. Craft a sub-query with basic predicate
 - iv. Use scalar functions
 - v. Explain the purpose of user-defined types and user-defined functions
 - vi. Consider performance issues
 - vii. Explain the purpose of the optimizer
 - viii. Identify the affect and scope of a COMMIT or ROLLBACK statement
- b. Maintaining Data
- i. Create a simple table to test DML statements
 - ii. Create a view
 - iii. Insert rows into a table
 - iv. Update data in a table
 - v. Delete rows from a table
 - vi. Drop a table
- 8. Information Storage and Retrieval**
After completing this unit, you should be able to:
- a. Data Moving Data
- i. Use the EXPORT utility to extract data from a table
 - ii. Use the IMPORT utility to insert data into a table
 - iii. Use the LOAD utility to insert data into a table
 - iv. Know when to use IMPORT versus LOAD utilities
 - v. Use the db2move utility
 - vi. Use the db2look utility
 - vii. Understand table space states after LOAD
- 9. Data Type Mapping- DB2 vs. Oracle**
After completing this unit, you should be able to:
- i. Determine the differences between Oracle and DB2 UDB data types
 - ii. Use the proper DB2 UDB data types
 - iii. Explore other data type mapping possibilities
 - iv. Understand the use of null data

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIBMB401	UG	Business Intelligence	3	1	2	5	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

The student will have ability to:

1. Gain the depth knowledge of data which helps the industry to take better decision
2. Understand how business analysis Software works to analyze the data.
3. Learn how business Intelligence can be applied.
4. Create reports, dashboards, stories and cross reports and accessing them accordingly.
5. Visualize the data in many forms and ways.

Course Outcomes:

1. The importance of analytics and how its transforming the world today
2. Understand how analytics provided a solution to industries using real case studies
3. Explain what is analytics, the various types of analytics, and how to apply it
4. Understand how a business analysis software works, and its architecture
5. Describe a reporting application, its interface, and the different report types
6. Create different types of advanced reports
7. Understand Active Reports and how to create them

SYLLABUS

UNIT-I Analytics Overview: The history of analytics and how it has changed today ,Understanding how to analyze unstructured data ,Understanding how analytics is making the world smarter ,Understanding where the future of analytics lies, Explaining why successful enterprises need business analytics ,Understanding how business analytics can help turn data into insight ,Understanding how predictive analytics is transforming all types of organizations ,Explaining how analytics supports retail companies ,Understanding how analytics can reduce crime rates and accidents ,Explaining the use of analytics in law enforcement and insurance companies ,Understanding how analytics can affect the future of education, Understanding the importance of business analytics ,Comprehend how big data and analytics can help in understanding consumer/customer behavior ,Explaining how analytics can help manage assets ,Understanding how analytics can help combat fraud ,Explaining how analytics can help us to understand social sentiments.

UNIT-II Business Intelligence and Analytics: Explaining what is analytics, Defining various types of analytics, Demonstrating how to apply analytics, Describing business intelligence, Demonstrating how to apply business intelligence.

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UNIT–III Create list reports, Crosstab reports & Present data graphically: Learning how to access content, use reports, and create dashboards ,Learning how personalize the IBM Cognos Analytics portal, Group, format, and sort list reports ,Describing the various options for aggregating data ,Creating a multi-fact query ,Creating a report with repeated data, Creating filters to narrow the focus of reports ,Examining detail filters and summary filters ,Determining when to apply filters on aggregate data, Formatting and sort crosstab reports ,Creating complex crosstab reports using drag and drop functionality ,Creating crosstab reports using unrelated data items, Creating charts containing peer and nested columns ,Presenting data using different chart type options ,Adding context to charts ,Creating and reuse custom chart palettes ,Introduction to visualization ,Presenting key data in a single dashboard report, Identifying various prompt types ,Using parameters and prompts to focus data ,Searching for prompt types ,Navigating between pages, Creating calculations based on the data in the data source ,Adding run-time information to the reports ,Creating expressions using functions, Enhancing report design with report objects ,Reusing objects within the same report ,Sharing layout components among separate reports ,Discussing report templates ,Choosing options to handle reports with no available data, Creating multi-lingual reports ,Highlighting exceptional data ,Showing and hide data ,Conditionally render objects in reports ,Conditionally format one crosstab measure based on another, Knowing how to let users navigate from a specific report to a target report ,Passing parameter values to filter the data in drill-through targets, Navigating through multiple reports, Force page breaks in reports ,Modifying existing report structures ,Applying horizontal formatting ,Specifying print options for PDF reports ,Formatting data and report objects

UNIT–IV IBM Cognos Analytics: Describing IBM Cognos Analytics and its position within an analytics solution ,Describing IBM Cognos Analytics components ,Describing IBM Cognos Analytics at a high level ,Describing IBM Cognos Analytics security at a high level ,Explaining how to extend IBM Cognos Analytics Building query models and connect them to the report layout ,Editing an SQL statement to author custom queries ,Adding filters and prompts to a report using the query model, Creating reports by merging query results ,Creating reports by joining queries ,Combining data containers based on relationships from different queries ,Filtering reports on session parameter values ,Navigating a briefing book using a table of contents ,Creating dynamic headers and titles that reflect report data ,Navigating to specific locations in reports ,Creating a customer invoice report ,Controlling report displays using prompts ,Specifying conditional formatting values using prompts ,Specifying conditional rendering of objects based on prompt selection ,Creating sorted and filtered reports based on prompt selection, Creating a report that displays summarized data before detailed data ,Highlighting alternate rows in a list report ,Creating a report using an external data file ,Using single data items to summarize report information, Examining the report specification structure ,Modifying a report specification ,Adding custom toolbox objects and custom template options, Distributing reports using bursting ,Creating burst keys ,Identifying report recipients and data items using burst tables ,Distributing reports using email and the Business Analysis Solution Connection ,Creating tooltips that clarify report data ,Sending emails using links in a report, Describing Active Reports, and their value ,Saving Active Reports

UNIT–V Focus reports using prompts and Extend reports using calculations: Creating Active Reports as prompt pages, Converting existing reports to Active Reports , Explaining security considerations in Active Reports ,Debugging Active Report behavior, Describing active

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report connections ,Filtering and selecting active report controls, Modifying the interactive behavior of report controls ,Identifying active report controls and variables, Using variables to control multiple controls independently ,Controlling multiple controls from a single variable ,Authoring and optimizing active reports for mobile consumption, Describing characteristics of traditional charts in Active Reports, Controlling data display using decks and data decks ,Using decks and data decks to display traditional charts, Optimizing decks for performance ,Describing characteristics of RAVE visualizations

TEXT BOOKS:

1. IBM Cognos Business Intelligence 10: The Official Guide
2. IBM Cognos 10 Report Studio Cookbook, Second Edition
3. IBM Cognos 10 Report Studio: Practical Examples

REFERENCES:

1. IBM Material for Business intelligence

LIST OF EXPERIMENTS:

1. Examine list reports ,Group data ,Include list headers and footers ,Format list columns , Enhance a list report, Understand fact/measure data ,Understand aggregate data, Understand difference in aggregation ,Explore data aggregation ,Use shared dimensions to create multi-fact queries ,Create a multi-fact query in a list report ,Add repeated information to reports Create a mailing list report ,Focus reports using filters ,Create filters ,Filter your data with advanced detail filters , Apply filters to a report, Determine when to apply a filter with aggregation , Apply a detail filter on fact data in a report ,Filter your data with summary filters ,Apply a summary filter to a report Using Rational Rose do the following for a given source code. Apply pre-defined source filters , Create a report focused on top performing product types and product lines.
2. Create a Crosstab report ,Add measures to Crosstab reports ,Data sources for Crosstabs ,Create a simple Crosstab report ,Create complex Crosstab reports ,Create Crosstab nodes and Crosstab node members ,Create complex Crosstab reports ,Format Crosstab reports ,Add unrelated items to Crosstabs edges ,Sort and format a Crosstab report ,Present unrelated items in a Crosstab using a discontinuous Crosstab.
3. Create a Visualization report ,Different chart options ,Create charts containing peer and nested items, Create and reuse custom chart palettes ,Add data-driven baselines and markers to charts, Create and format a chart report ,Compare values and highlight

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proportions using gauge charts and pie charts, Create a gauge report and a pie chart report ,Display items on separate axes , Show the same data graphically and numerically ,Customize charts ,RAVE , Display RAVE visualizations , Create a dashboard report.

4. Examine parameters and prompts ,Create a parameter item on the report, Build a prompt page, Add a prompt item to a report ,Create a prompt by adding a parameter.
5. Identify prompt type, Add a value prompt to a report ,Add pages to a report ,Add a Select & search prompt to a report ,Create a cascading prompt, Create a cascading prompt, Focus a report using value prompts.

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

1. Introduction to cloud computing and platforms on Cloud
2. Understand Business Problems and evolution of IBM cloud
3. Introduced to Cloud Architecture
4. Understanding Cloud Foundry and resources
5. Introduced to weather insights on IBM cloud
6. Working on Chatbot using Watson services
7. Understanding DevOps and its lifecycle
8. Introduced to nodes used in Cloud application development

Course Outcomes:

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
2. Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Choose the appropriate technologies, algorithms, and approaches for the related issues.
5. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
6. Provide the appropriate cloud computing solutions and recommendations according to the applications used.
7. Attempt to generate new ideas and innovations in cloud computing.

SYLLABUS

Unit I: Introduction to Cloud Computing

Traditional way of working in IT, Traditional IT Challenges, Future Trend in IT, What is Cloud Computing Cloud Characteristics, service and Delivery models, Cloud Computing helps overcome IT challenges, Traditional On-premises Core IT, Cloud Service, IBM Cloud – IAAS, PAAS and SAAS,IBM cloud Infrastructure (IaaS) Offerings,IBM Cloud Platform as a service offerings, Cloud Delivery models,Private Cloud,Public Cloud

Unit II: Deep Dive in to IBM Cloud

What is IBM Cloud,Evolution of IBM Cloud,Business Problems,Developer Problems,Why IBM Cloud Speed – Time to Value,Predictability – Reduced Risk and Cost,Agility,IBM Cloud UI tour,IBM Cloud Login IBM cloud UI Dashboard,IBM Cloud Region,Organizations, spaces,

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users and domains, Organizations Spaces, Quota, User Management, Monitoring and Logs, IBM Cloud Catalog, Containers, IBM containers on IBM Cloud, IBM Cloud Container Advantages and Differentiators Services, IBM cloud value to developers

Unit III: IBM Cloud Architecture

Is IBM cloud a cloud foundry, How cloud foundry works, How the cloud balances its load, how apps run anywhere, How CF organizes Users and workspaces, Where CF stores Resources, How CF components communicate, How to monitor and analyze a CF deployment, Using services with CF, What is cloud foundry, Cloud foundry languages, frameworks and services, Cloud foundry architecture – high level, Cloud foundry architecture – CF kernel internal, description of each of the components, Cloud controller and diego brain nsync, BBS and Cell reps, App storage and execution, Diego Cell messaging, metrics and logging, Cloud foundry – application staging, Various IBM cloud architecture, IBM cloud dedicated architecture, Cloud foundry command line interface, Important CF CLI Calls, Cloud foundry tools

Unit IV: IBM Cloud Services

IBM cloud services, Analytics Services, Types of data services available in IBM Cloud, Cloud API feature, Watson Services, Storage, DevOps, Auto scaling, vertical scaling and horizontal scaling, Adding a service to application, Requesting a new service instance, Configuring your application to interact with a service, VCAP services, service Metadata, IBM cloud user provided service instance – service metadata
IBM cloud user provided service instance – user interface service metadata

Unit V: Nodes Creation

What is IBM cloud DevOps Services, Tool chain overview, Code and eclipse orion web IDE, Git Repos and Issue tracking, Delivery pipeline, Stages, jobs, Installing Node.js windows build tools, Running Node RED, Node RED architecture, Creating nodes RED flow, Types of Nodes and functions, Inject and Debug Node, Change Node.

Text Books:

1. Cloud Computing Bible by Barrie Sosinsky, Wiley
2. Cloud Computing: Concepts, Technology & Architecture by Zaigham Mahmood, Ricardo Puttini, Thomas Erl, The Prentice Hall Service

Reference Books:

1. Cloud Computing: Saas, Paas, Iaas, Virtualization, Business Models, Mobile, Security and More Paperback – 2012 by Dr Kris Jamsa Kris Jamsa, Jones & Bartlett;
2. Cloud Computing Paperback – 2019 by Mehul Mahrishi Kamal Kant/Ruchi Doshi/ Temitayo Fagbola, BPB Publications
3. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, 1e Paperback – 2008 by Miller, Pearson

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SEMESTER IV

List of Practical:

1. Write a program to print the simple “hello world” using node.js while using node.js command prompt.
2. Write a program to perform read, write operation using file system module in node.js.
3. Create a package.json file with the help of command prompt.
4. Write the steps to create a server in node.js.
5. Write the steps to connect a node.js application with database.
6. Upload the file on local server using node.js.
7. Send email from your account to other account using node.js.
8. Json parsing using node.js.
9. Form submission using node.js.
10. Perform Event handling using node.js.

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SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIBMA401	UG	Data Visualization (with R) + Machine learning with R	3	1	2	5	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

1. Describe R syntax, including assigning variables
2. Describe simple operations with one of R's most important data structures – vectors
3. Describe lists, matrix, arrays and data frames.
4. Describe conditional statements, functions, classes and debugging.
5. Describe important functions for character strings and dates in R.
6. Describe popular algorithms Classification, Regression, Clustering, and Dimensional Reduction.
7. Develop understanding of interpreting and identifying patterns and trends
8. Describe steps to create customized graphics and charts
9. Understanding Supervised vs Unsupervised Learning
10. Explore how Statistical Modeling relates to Machine Learning
11. Introduce Classification, Regression, Clustering, and Dimensional Reduction
12. Describe Train/Test Split, Root Mean Squared Error
13. Explore many algorithms and model like Random Forests

Course Outcomes:

After the successful completion of this course students will be able to:

1. Command over R programming for Data Science;
2. Describe the key components of the Machine Learning field and its relation and role in Computer Science;
3. Identify and describe Machine learning algorithms, including knowledge of useful packages;
4. Design and implement appropriate ML model solution techniques for such problems;
5. Analyze and understand the computational trade-offs involved in applying different data visualization techniques and features.
6. Communicate clearly and effectively using the technical language of the field correctly.

SYLLABUS

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SEMESTER IV

Unit I: R Programming : Math, Variables, and Strings, Vectors and Factors, Vector operations, Data Structures-Arrays & Matrices, Lists, Data frames, R programming fundamentals- Conditions and loops, Functions in R, Objects and Classes, Debugging, Working with data in R- Reading CSV and Excel Files, Reading text files, Writing and saving data objects to file in R, Strings and Dates in R-String operations in R, Regular Expressions, Dates in R

Unit II: Data Visualization with R: Basic Visualization Tools-Bar Charts, Histograms, Pie Charts, Basic Visualization Tools Continued-Scatter Plots, Line Plots and Regression, Specialized Visualization Tools-Word Clouds, Radar Charts, Waffle Charts, Box Plots, How to create Maps- Creating Maps in R, How to build interactive web pages- Introduction to Shiny, Creating and Customizing Shiny Apps, Additional Shiny Features

Unit III: Machine Learning vs Statistical Modeling & Supervised vs Unsupervised Learning: Machine Learning Languages, Types, and Examples, Machine Learning vs Statistical Modelling, Supervised vs Unsupervised Learning, Supervised Learning Classification, Unsupervised Learning, Supervised Learning I, K-Nearest Neighbors, Decision Trees, Random Forests, Reliability of Random Forests, Advantages & Disadvantages of Decision Trees

Unit IV: Supervised Learning II, Dimensionality Reduction & Collaborative Filtering: Supervised Learning II, Regression Algorithms, Model Evaluation, Model Evaluation: Over fitting & Under fitting, Understanding Different Evaluation Models, Dimensionality Reduction: Feature Extraction & Selection, Collaborative Filtering & Its Challenges

Unit V: Unsupervised Learning: K-Means Clustering plus Advantages & Disadvantages, Advantages & Disadvantages, Measuring the Distances Between Clusters - Single Linkage Clustering.

Text Books:

1. IBM Text Book
2. Cognitive computing with IBM Watson (by Rob High (Author), Tanmay Bakshi (Author), 30 April 2019)-1st edition.

Reference Books:

1. R in a Nutshell: Second Edition Paperback- (23 Oct 2012) by Joseph Adler-2nd edition.
2. Applied Predictive Modeling Hardcover- (27 Apr 2018) by Max Kuhn, Kjell Johnson- 1st edition.
3. An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics) Hardcover- (29 Sep 2017), by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani- 2nd Edition.

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SEMESTER IV

List of Practical:

1. Basic Syntaxes and how to install packages
2. R-statements with conditions.
3. Create Looping in multiple conditions.
4. Creating pie and histogram with R package.
5. Maps
6. Creating dashboard and Shiny app
7. K-Nearest Neighborhood.
8. Linear and Multiple Regression algorithm
9. Logistic Regression
10. K-Means clustering algorithm

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SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIT406	UG	Unix and Shell Programming Lab	0	0	2	1	0	0	0	0	50

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To provide introduction to UNIX Operating System and its File System.
2. To gain an understanding of important aspects related to the SHELL and the process
3. To develop the ability to formulate regular expressions and use them for pattern matching.
4. To provide a comprehensive introduction to SHELL programming, services and utilities.
5. To develop the ability to perform different networking tasks.

Course Outcomes:

On completion of this course:

1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System
2. Demonstrate UNIX commands for file handling and process control
3. Write Regular expressions for pattern matching and apply them to various filters for a specific task
4. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.
5. Diagnose network using different networking utilities of UNIX.

Syllabus:

UNIT-I

Introduction to UNIX - The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal and External Commands, Command Structure.

General purpose utilities: cal, date, echo, printf, bc, script, passwd, path, who, uname, tty, stty, pwd, cd, mkdir, rmdir, od.

UNIT-II

Handling Files and C Environment - The File System, cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff, gzip, tar, zip, df, du, mount, umount, chmod, The vi editor, security by file Permissions. Networking commands: ping, telnet, ftp, finger, arp, rlogin.

The C compiler, vi editor, compiler options, and run the programs.

UNIT-III:

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SEMESTER IV

Shell Basics - Types of shells, Shell Functionality, Work Environment, Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical expressions. Conditional statements: If-else-elif, Test command, Logical operators - AND, OR, NOT, Case –esac. Loops: While, For, Until, Break & continue.

UNIT-IV:

Command Line Arguments & Regular Expression - Command line arguments: Positional parameters, Set & shift, IFS. Functions & file manipulations: Processing file line by line, Functions. Regular Expression & Filters: Regular expression, Grep, cut, sort commands, Grep patterns.

UNIT-V:

SED and AWK - SED: Scripts, Operation, Addresses, commands, Applications, grep and sed.

AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

Text Books:

1. Stephen Prata “Advanced UNIX: A Programming's Guide”, BPB Publications, 2017.
2. Maurice J. Bach “Design of UNIX O.S. “, PHI Learning, 2015.
3. Brian W. Kernighan & Robe Pike, “The UNIX Programming Environment”, PHI Learning, 2015.
4. Sumitabha Das: “YOUR UNIX – The Ultimate Guide”, Tata McGraw Hill, 23rd reprint, 2012.
5. Yashavant Kanetkar, “Unix Shell programming”, 1st Edition, BPB Publisher, 2010.

Reference Books:

1. Behrouz A. Forouzan, Richard F. Gilbery, “Unix and Shell Programming”, 1st Edition, Cengage Learning India, 2003.
2. Graham Glass, King Ables, “Unix for programmers and users”, 3rd Edition, Pearson Education, 2009.
3. Sumitabha Das, “Unix Concepts and Applications”, 4th Edition. TMH, 2006.
4. N.B. Venkateswarlu, “Advanced Unix programming”, 2nd Edition, B S Publications, 2010.

List of Practical:

1. Perform installation of UNIX/LINUX operating system.
2. Study of UNIX general purpose utility commands.
3. Execution of various file/directory handling commands.
4. Working with the vi editor: Creating and editing a text file with the vi text editor using the standard vi editor commands.
5. Write a shell script for calculator (to perform basic arithmetic and logical calculations).
6. Write a shell script sum.sh that takes an unspecified number of command line arguments (up to 9) of ints and finds their sum. Modify the code to add a number to the sum only if the number is greater than 10.
7. Write a shell script that will take an input file and remove identical lines (or duplicate lines from the file).

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SEMESTER IV

8. Write a shell script takes the name a path (eg: /afs/andrew/course/15/123/handin), and counts all the sub directories (recursively).
9. Shell scripts to explore system variables such as PATH, HOME etc.
10. Write a shell script that takes a name of a folder as a command line argument, and produce a file that contains the names of all sub folders with size 0 (that is empty sub folders)
11. Execution of various system administrative commands.
12. Write awk script that uses all of its features.
13. Write a shell script to display list of users currently logged in.
14. Write a shell script to delete all the temporary files.
15. Write a shell script to search an element from an array using binary searching.
16. Write shell script to perform different string operations of arrays.

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SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIT306	UG	Mobile App Development Lab	0	0	2	1	0	0	0	0	50

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The student will have ability to:

1. Describe those aspects of mobile programming that make it unique from programming for other platforms.
2. Critique mobile applications on their design pros and cons,
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
4. Program mobile applications for the Android operating system that use basic and advanced phone features, and
5. Deploy applications to the Android marketplace for distribution.

Course Outcomes:

Upon completion of the subject, students will be able to:

1. Students will understand aspects of mobile.
2. Students will be able to develop rapid prototyping techniques to design and develop sophisticated mobile interfaces.
3. Students will be able to create Program mobile applications for the Android operating system that use basic and advanced phone features, and
4. Students will be able to build applications to the Android marketplace for distribution.

Syllabus:

UNIT-I

Introduction to mobile Devices and Administrative, Mobile Devices vs. Desktop devices - ARM and Intel Architectures - Power Management - Screen Resolution - Touch interfaces - Application development - App Store, Google Play, Windows Store - Development Environments Introduction: XCode , Eclipse , PhoneGAP, etc - Native vs. web applications.

UNIT-II

Mobile OS Architectures: Comparing and Contrasting architectures of all three – Android, iOS and Windows - Underlying OS (Darwin vs. Linux vs. Win 8) - Kernel structure and native level programming - Runtime (Objective-C vs. Dalvik vs. WinRT) - Approaches to Power Management – Security.

UNIT-III

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SEMESTER IV

Introduction to Android Development Environment, Android/iOS/Win 8 Survival and basic apps, Mobile frameworks, Tools, Native Level Programming on Android Low-level programming on (jailbroken) iOS o Windows low level APIs. Study Different Open Source Frameworks, Tools And Basic Languages Used For Mobile Development

UNIT-IV

Intents and Service: Android ,Intents and Services , Characteristics of Mobile Applications, Successful Mobile Development, Storing and Retrieving Data, Synchronization and Replication of Mobile Dat, Android Storing and Retrieving Data ,Working with a Content Provider, Communications Via Network and the Web, State Machine, Correct Communications Model

UNIT-V

Android Networking and Web , Telephony, Wireless Connectivity and Mobile Apps, Notifications and Alarms, Memory Management, Graphics Performance and Multithreading, Graphics and UI Performance Android Graphics and Multimedia Mobile Agents , Location Mobility and Location Based Packaging and Deploying Performance Best Practices.

TEXT BOOKS:

1. John Horton, “Android Programming for Beginners: Build in-depth, full-featured Android apps starting from zero programming experience” 2nd Edition, Packt Publishing, October 31, 2018
2. Mike van Drongelen, Aravind Krishnaswamy, “Lean Mobile App Development” ,2nd edition, Packt Publishing, 28 Nov 2017
3. Chris Griffith , “Mobile App Development with Ionic”, Revised Edition, O’Reilly Media, August 2017
4. Rick Boyer , Kyle Mew, “Android Application Development Cookbook” 2nd Revised Edition, Packt Publishing, March 31, 2016
5. Christian Keur “iOS Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) ” 6 edition Big Nerd Ranch Guides Publishing 27 Dec. 2016

REFERENCES:

1. <http://www.tutorialspoint.com/android/>
2. <https://www.lynda.com/Mobile-Apps-training-tutorials>
3. https://www.tutorialspoint.com/ios/ios_objective_c.htm
4. <https://developer.android.com/training/basics/>

List of Practical:

1. Study of difference open source mobile development tools.
2. Installation of eclipse and Android Studio.
3. Develop an application that uses GUI components, Font and Colors.
4. Develop an application that uses Layout Managers and event listeners.
5. Develop a native calculator application.
6. Develop an application that draws basic graphical primitives on the screen.
7. Develop an application that makes use of database.
8. Develop an application that makes use of RSS Feed.
9. Implement an application that implements Multi-threading.
10. Develop a native application that uses GPS location information.
11. Implement an application that writes data to the SD card.

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12. Implement an application that creates an alert upon receiving a message.
13. Develop a mobile application that creates alarm clock.

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