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BE BOUNDLESS

BENGALURU CITY UNIVERSITY

CHOICE BASED CREDIT SYSTEM
(Semester Scheme with Multiple Entry and Exit Options for
Under Graduate Course)

Syllabus for B.Sc. Computer Science
(V & VI Semester)

2023-24 onwards

BANGALORE CITY UNIVERSITY

PROCEEDINGS OF THE MEETING OF BOARD OF STUDIES HELD IN COMPUTER SCIENCE (UG AND PG), BANGALORE UNIVERSITY HELD ON 09-09-2023 THROUGH ONLINE MODE AT 11:30 AM

The following members were present:

1. Dr. Guru D.S. Department of Computer Science , Mysore Univeristy
2. Dr. Susesha , Department of Computer Science , Mysore Univeristy
3. Dr. Prabhakar C.J , Kuvempu University, Shimogga
4. Dr. Chandrakanth Naikodi,Department of Computer Science ,Davanagere University
5. Dr. Prathibha V Kalburgi ,Ramaiah College of Arts Science, and Commerce Bangalore
6. Mrs. Amalorpavam ,Sambram Academi of Management Studies ,Bangalore
7. Smt. Nagarathnamma S.M,Maharani Cluster Univeristy, Bangalore
8. Dr. B.L Muralidhara, Department of Computer Science, Bangalore University - Chairperson

The Following Members did not attend the meeting:

1. Dr. Bhagyawana S Mudigowda ,Maharani Cluster University, Bangalore

The Chairperson presented the syllabus of the V and VI semester BCA (NEP), B.Sc. Computer Science and BVoC (Computer Science) to the Committee. The Committee discussed the syllabus in detail and approved the same.

The Chairperson thanked all members for their active participation.

(Dr. B.L Muralidhara) 09.09.2023
Chairman, BoS – Computer Science

1	Dr. Muralidhara B L Professor Department of Computer Science Bangalore University	CHAIRPERSON
2	Dr. Guru D.S Professor PG Department of Computer Science Mysore Univeristy	Member
3	Dr. Susesha Professor, PG Department of Computer Science Mysore Univeristy	Member
4	Dr. Prabhakar C.J Professor Kuvempu University, Shimogga	Member
5	Dr. Chandrakanth Naikodi Associate Professor Department of Computer Science Davanagere University	Member
6	Dr. Prathibha V Kalburgi Ramaiah College of Arts Science, and Commerce Bangalore	Member
7	Mrs. Amalorpavam Sambram Academi of Management Studies Bangalore	Member
8	Dr. Bhagyawana S Mudigowda Associate Professor Maharani Cluster University, Bangalore	Member
9	Smt. Nagarathnamma S.M Associate Professor Maharani Cluster Univeristy, Bangalore	Member

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
I	CS-C1T	Problem Solving Techniques	4	OE1: Open Elective	3	25
	CS-C2P	Problem Solving Lab using C	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC I :	2	
				Physical Education	1	
				Health & Wellness	1	
II	CS-C3T	Data Structure	4	OE2: Open Elective	3	25
	CS-C4P	Data Structures Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	Environmental studies	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
III	CS-C5T	Object Oriented Programming using Java	4	OE3: Open Elective	3	25
	CS-C6P	Java Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	SEC II :	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
IV	CS-C7T	Operating Systems	4	OE4: Open Elective	3	25
	CS-C8P	Linux Lab	2	Language L1	3	
	XX	Other Option Theory	4	Language L2	3	
	XX	Other Option LAB	2	The Constitution of India	2	
				Physical Education	1	
				NCC/NSS/CL/R&R	1	
V	CS-C9T	Database Management System	4	SEC III : Employability	3	27
	CS-C10T	Artificial Intelligence	4			
	CS-C11P	Database Management System Lab	2			
	CS-C12P	Artificial Intelligence Lab	2			
	XX	Other Option (Double Major)	12			

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses (AECC)	Credits	Total Credits
VI	CS-C13T	Python Programming	4	Internship	2	26
	CS-C14T	Computer Networks	4			
	CS-C15P	Python Programming Lab	2			
	CS-C16P	Computer Networks Lab	2			
	XX	Other Option (Double Major)	12			

CA-C9T: DATABASE MANAGEMENT SYSTEMS

Total Teaching Hours: 60   No. of Hours / Week: 04

UNIT - 1   [15 Hours]
Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT - 2   [15 Hours]
Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes. Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT

UNIT – 3   [15 Hours]
Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra. Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT – 4   [15 Hours]
Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Text Books:
1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.
2. Silberschatz, Korth and Sudharshan Data base System Concepts, 7th Edition, Tata McGraw Hill, 2019.

References:
1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009
2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: 3rd Edition, McGraw-Hill, 2003

CA-C10T: ARTIFICIAL INTELLIGENCE

Total Teaching Hours : 60   No. of Hours / Week: 04

Course Outcomes:
CO 1. Understand the various characteristics of problem solving agents and apply problem solving through search for AI applications.
CO 2. Appreciate the concepts of knowledge representation using Propositional logic and Predicate calculus and apply them for inference/reasoning.
CO 3. Obtain insights about Planning and handling uncertainty through probabilistic reasoning and fuzzy systems.
CO 4. Understand basics of computer vision and Natural Language Processing and understand their relevance in AI applications.
CO 5. Obtain insights about machine learning, neural networks, deep learning networks and their significance.

UNIT I :   [15 Hours]

Introduction to Al: Intelligent Agents: Agents and environment, the concept of Rationality, the nature of environment, the structure of agents; Problem solving: Problem-solving agents; Uninformed search strategies: DFS, BFS; Informed Search: Best First Search, A* search, AO* search; Adversarial Search & Games: Two-player zero-sum games, Minimax Search, Alpha-Beta pruning.

 UNIT – II   [15 Hours]

Knowledge-based Agents, The Wumpus world as an example world, Logic, Propositional logic, First-order predicate logic, Propositional versus first-order inference, Unification and lifting, Forward chaining, Backward chaining, Resolution, Truth maintenance systems.

UNIT - III   [15 Hours]

Introduction to Planning: Blocks World problem, Strips; Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, Fuzzy logic: Theory of Fuzzy sets, Operations on Fuzzy sets and Fuzzy logic, Reasoning with Fuzzy logic; Robotics: Fundamentals of Robotics, Robot Kinematics; Computer Vision: Introduction to image processing and classification, object detection.

UNIT – IV   [15 Hours]

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing; Expert Systems: Architecture and role of expert systems, two case studies of Expert Systems; Introduction to Machine learning: Supervised learning, unsupervised learning, reinforcement learning; Neural Networks: Introduction, basics of ANN,

Text Book/References

1. Russell, S. and Norvig, P.,   "Artificial Intelligence - A Modern Approach", 3rd edition, Prentice Hall

2. Nilsson Nils J, "Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers Inc. San Francisco, CA, ISBN: 978-1-55-860467-4.

3. Dan W Patterson, "Introduction to Artificial Intelligence & Expert Systems", PHI Learning 2010.

CA- C11P: DATABASE MANAGEMENT SYSTEMS LAB

PART – A

1. Draw E-R diagram and convert entities and relationships to relation table for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college) Consider the Company database with following Schema

   EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN, DNO)

   DEPARTMENT (DNAME, DNUMBER,MGRSSN,MSRSTARTDATE)

   DEPT_LOCATIONS (DNUMBER, DLOCATION)

   PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)

   WORKS_ON (ESSN, PNO<HOURS)

   DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

2. Perform the following:

   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database,

   Creating Tables (With and Without Constraints), Inserting/Updating/Deleting

   Records in a Table, Saving (Commit) and Undoing (rollback)

3. Perform the following:

   a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a

   Database.

4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

5. Execute the fallowing queries

   a. How the resulting salaries if every employee working on the „Research" Departments is given a 10% raise.

   b. Find the sum of the salaries of all employees of the „Accounts" department, as well as the maximum salary, the minimum salary, and the average salary in this department

6. Execute the fallowing queries
   a. Retrieve the name of each employee Controlled by Department number 5 (use EXISTS Operator).
   b. Retrieve the name of each dept and number of employees working in each Department which has at least 2 employees

7. Execute the fallowing queries
   a. For each project, retrieve the project number, the project name, and the number of Employee who work on that project.(use GROUP BY)
   b. Retrieve the name of employees who born in the year 1990"s

8. For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

9. For each project on which more than two employees work, retrieve the project number, project Name and the number of employees who work on that project.

10. For a given set of relation tables perform the following: Creating Views (with and without check option),Dropping views, Selecting from a view

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the Following queries.

      BRANCH (Branchid, Branchname, HOD)
      STUDENT (USN, Name, Address, Branchid, sem)
      BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
      AUTHOR (Authorid, Authorname, Country, age)
      BORROW (USN, Bookid, Borrowed_Date)

1. Perform the following:
    a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
    Execute the following Queries:

2. a. List the details of Students who are all studying in 2nd sem BCA.
    b. List the students who are not borrowed any books.

3. a. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_ Date of 2nd sem BCA Students who borrowed books.
    b. Display the number of books written by each Author.

4. a. Display the student details who borrowed more than two books.
    b.Display the student details who borrowed books of more than one Author.

5. a. Display the Book names in descending order of their names.
    b. List the details of students who borrowed the books which are all published by the same publisher.

    Consider the following schema:
    STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6. Perform the following:
    a. Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

7. Execute the following queries:
    a. Find the GPA score of all the students.
    b. Find the students who born on a particular year of birth from the date_of_birth column.

8. a. List the students who are studying in a particular branch of study.
    b. Find the maximum GPA score of the student branch-wise.

ARTIFICIAL INTELLIGENCE LAB

Total Teaching Hours: **No. of Hours / Week:**

Course Outcomes:

CO 6. Solve search problems including heuristic search and constraint satisfaction search.

CO 7. Understand and apply image processing techniques for image enhancement, image detection and recognition.

CO 8. Understand and implement supervised machine learning and probabilistic machine learning algorithms.

CO 9. Implement unsupervised learning through clustering.

CO 10. Obtain insights about working of neural networks and neural network based learning.

CO 11. Perform NLP operations to gain understanding of text processing and analytics.

Please Note: Artificial Intelligence lab programs can be implemented in Python using the relevant Python libraries.

Lab Programs

1. Write a program to solve the Water Jug Problem using Breadth Frist Search (BFS).

2. Write a program to find the optimum path from Source to Destination using A* search technique.

3. Write a program to solve the 4 – Queens Problem.

4. Write a program to implement Minimax search for 2 Player games.

5. Using OpenCV python library capture an image and perform the following image processing operations:
    a) Image Resizing
    b) Blurring of Image
    c) Grayscaling of image
    d) Scaling and rotation
    e) Edge Detection
    f) Segmentation using thresholding
    g) Background subtraction
    h)   Morphological operations

6. Write a program with two menu options 1) Capture Image and 2) Recognise Image. This program should capture pictures of five students and save them. The program should identify/recognise the student and display the student name.

Using Keras/any standard dataset write the programs for the following Machine learning tasks:

7. Use the Decision tree classifier to classify the dataset.

8. Use the Naïve Bayes classifier to classify the dataset.

9. Implement K-Means clustering Algorithm.

10. Using Python NLTK, perform the following Natural Language Processing (NLP) tasks for any textual content.
    a) Tokenizing
    b) Filtering Stop Words
    c) Stemming
    d) Part of Speech tagging
    e) Chunking
    f) Named Entity Recognition (NER)

11. Write a program that uses Neural networks for image classification using Keras Iris dataset.

CA-C13T: PYTHON PROGRAMMING

Total Teaching Hours : 60   No. of Hours / week: 04

UNIT - I   [15 Hours]
Parts Python Programming Language: Python Interpreter/Shell, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() function and Is operator, Dynamic and Strongly Typed Language.**Control Flow Statements:**The if Decision Control Flow Statement, The if…else DecisionControl FlowStatement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, TheforLoop, The continue and break Statements. **Functions**: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Life time of Variables, Default Parameters, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String operations,Accessing Characters in StringbyIndexNumber, String Slicing and Joining, String methods

UNIT - II   [15 Hours]
Lists: Creating Lists, BasicListOperations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, ThedelStatement, **Dictionaries:** Creating Dictionary, Accessing and modifying key:value pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary methods, ThedelStatement**. Tuples and Sets:** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples,Built-In Functions Used onTuples, Relations between Tuples and Lists, Relations between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Frozenset.

UNIT - III   [15 Hours]
Files: Types of files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files,The Pickle module, Reading and writing CSV files, **Object-Oriented Programming:** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data attributes, Encapsulation, Inheritance, The Polymorphism.

UNIT - IV   [15 Hours]
D**ata Visualization:** Generating Data-Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Rolling Dice with Plotly. Downloading Data- The CSV File Format, Mapping Global Data Sets: JSON Format, **Working with APIs:** Using a Web API, Visualizing Repositories Using Plotly.

Text Books:
1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372. [Unit I&II- 2,3,4,5,6,7,8,9 Unit III-11,12].
2. Eric Matthes, "Python Crash Course- A Hands-On, Project-Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.[Unit III-15, Unit IV-16]
3. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016. [Unit IV- 2,5].

Reference Books:
1. Kamthane, A. N., & Kamthane, A.A. , "Programming and Problem Solving with Python", McGraw Hill Education, 2017.
2. Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739.
3. Ljubomir Perkovic, "Introduction to Computing Using Python- An Application Development Focus",Wiley,2012.

CA-C14T: COMPUTER NETWORKS

Total Teaching Hours : 60   No. of Hours / Week: 04

UNIT - I   [15 Hours]
Introduction: Data Communications, Networks, Network Types, Internet History, Network Models: Protocol Layering, The OSI Model, TCP/IP Protocol Suite, Introduction to Physical Layer: Transmission Impairments, Data Rate Limits, Performance, Introduction to Data-Link-Layer: Link-Layer Addressing, Error Detection and Correction: Block Coding, Cyclic Codes, Checksum

UNIT - II   [15 Hours]
Data Link Control: Data-Link Layer Protocols, HDLC, Point-To-Point (PPP), Media Access Control (MAC): ALOHA, CSMA, CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, TDMA, CDMA

UNIT - III   [15 Hours]
Introduction to Network Layer: Network-Layer Services, Packet Switching, Network-Layer Performance, IPV4 Addresses, Network Layer Protocols: Internet Protocol (IP), ICMPv4, Mobile IP, Unicast Routing: Routing Algorithms, Unicast Routing Protocols, Next Generation IP: IPv6 Addressing

UNIT - IV   [15 Hours]
Introduction to Transport Layer: Introduction, Transport-Layer Protocols, Transport-Layer Protocols: User Datagram Protocol, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, TCP Congestion Control, Flow Control, Error Control, Application Layer: WWW, E-MAIL, Domain Name System (DNS), Quality of Service: Flow Control To Improves QoS, Integrated Services

Text Books:
1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill Education, 2013.

Reference Books:
1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, Prentice Hall, 2011.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks A System Approach", 5th Edition, MKP, 2012.
3. James F. Kurose , Keith W. Ross, " Computer Networking, A Top-Down Approach", 5thEdition, Pearson, 2012.

Web Resources:
1. https://www.geeksforgeeks.org/computer-network-tutorials/
2. https://codescracker.com/networking/
3. https://youtube.com/playlist?list=PLxCzCOWd7aiGFBD2-2joCpWOLUrDLvVV_

CA-C15P: PYTHON PROGRAMMING LAB

1. Write a program to demonstrate basic data type in python
2. Create a list and perform the following methods
   1) insert()   2) remove()   3) append()
   4) len()   5) pop()   6) clear()
3. Create a tuple and perform the following methods
   1) Add items   2) len()   3) check for item in tuple   4)Access items
4. Create a dictionary and apply the following methods
   1) Print the dictionary items   2) access items   3) use get()
   4)change values   5) use len()
5. Write a program to create a menu with the following options
   1. TO PERFORM ADDITITON   2. TO PERFORM SUBTRACTION
   3. TO PERFORM MULTIPICATION   4. TO PERFORM DIVISION
   Accepts users input and perform the operation accordingly. Use functions with arguments.
6. Write a python program to print a number is positive/negative using if-else.
7. Write a program for filter() to filter only even numbers from a given list.
8. Write a python program to print date, time for today and now
9. Write a python program to add some days to your present date and print the date added.
10. Write a program to count the numbers of characters in the string and store them in a dictionary data structure
11. Write a program to count frequency of characters in a given file.
12. Using a numpy module create an array and check the following: 1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array
13. Write a python program to concatenate the dataframes with two different objects
14. Write a python code to read a csv file using pandas module and print the first and last five lines of a file.
15. Write a python program which accepts the radius of a circle from user and computes the area (use math module)
16. Use the following data (load it as CSV file) for this exercise. Read this file using Pandas or Nu   mPy or using in-built matplotlib function.

Months	Pen	Book	Marker	Chair	Table	Pen stand	Total units	Total profit
1	2500	1500	5200	9200	1200	1500	21100	211000
2	2630	1200	5100	6100	2100	1200	18330	183300
3	2140	1340	4550	9550	3550	1340	22470	224700
4	3400	1130	5870	8870	1870	1130	22270	222700
5	3600	1740	4560	7760	1560	1740	20960	209600
6	2760	1555	4890	7490	1890	1555	20140	201400
7	2980	1120	4780	8980	1780	1120	29550	295500

8	3700	1400	5860	9960	2860	1400	36140	361400
9	3540	1780	6100	8100	2100	1780	23400	234000
10	1990	1890	8300	10300	2300	1890	26670	266700
11	2340	2100	7300	13300	2400	2100	41280	412800
12	2900	1760	7400	14400	1800	1760	30020	300200

a. Get total profit of all months and show line plot with the following Style properties
    Generated line plot must include following Style properties: –
    - Line Style dotted and Line-color should be blue
    - Show legend at the lower right location.
    - X label name = Months
    - Y label name = Sold units
    - Line width should be 4
b. Display the number of units sold per month for each product using multiline plots. (i.e., Separate Plotline for each product.
c. Read chair and table product sales data and show it using the bar chart.
    - The bar chart should display the number of units sold per month for each product. Add a separate bar for each product in the same chart.
d. Read all product sales data and show it using the stack plot

CA-C16P: COMPUTER NETWORKS LAB

1. Execute the following commands:
   arp, ipconfig, hostname, netdiag, netstat, nslookup, pathping, ping route, tracert
2. Study of different types of network cables.
3. Practically implement the cross-wired cable and straight wired cable using crimping tool.
4. Study of network IP address configuration: (Classification of address, static and dynamic address)
5. Study of network IP address configuration: (IPv4 and IPv6 , Subnet, Supernet)
6. Study of network devices: (Switch, Router, Bridge)
7. Configure and connect the computer in LAN.
8. Block th e website using "Windows Defender Firewall" in windows 10.
9. Share the folder in a system, and access the files of that folder from other system using IP address .
10. Share the printer in Network, and take print from other PC.
11. Configuration of wifi hotspot, and connect other devices (mobile / laptop).
12. Configuration of switches.
13. Configuration of I/O box fixing.
14. Making your own patch cord.
15. Configuration of VLAN using Packet Tracer/ GNS3
16. Configuration of VPN using Packet Tracer/ GNS3

References:
1.Paul Browning, "101 CompTIA Networs+ LABS", Reality Press Ltd, 2018.

Web References:
1.youtube.com/watch?v=rurs7cdT5cc
2.https://www.youtube.com/watch?v=_IOZ8_cPgu8
3.https://www.alphr.com/block-websites-windows/