ACADEMIC (1-BOARD OF STUDIES) SECTION

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1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

Swami Ramanand Teerth Marathwada University,Nanded
(NAAC Re-accredited with ‘A’ Grade)

Syllabus of

B.Sc. Information Technology (3 years)
(Revised CBCS IT pattern)

Introduced from Academic Year 2023-2024

B.Sc. Information Technology

B.Sc. Information Technology (3years) program / degree is a specialized program in computer sciences. It builds the student on studies in Computer Science and to become competent in the current race and development of new computational sciences. The duration of the study isof six semesters, which is normally completed in three years.

CBCS IT pattern

The B.Sc. Information Technology program as per CBCS IT (Choice based credit system) pattern, in which choices are given to the students under open electives and subject electives. The students can choose open electives from the wide range of options to them.

Eligibility and Fees

The eligibility of a candidate to take admission to **B.Sc. Information Technology** program is as perthe eligibility criteria fixed by the University. More details on admission procedure and fee structure can be seen from the prospectus of the college / institution as well as on website of the University.

Credit Pattern

Every course has corresponding grades marked in the syllabus structure. There are 24 credits per semester. A total of 144 credits are essential to complete this program successfully. The Grading pattern to evaluate the performance of a student is as per the University rules.

Every semester has a combination of Theory (core or elective) courses and Lab courses. Each theory course has 04 credits which are split as 03 external credits and 01 internal credit. The university shall conduct the end semester examination for 03 external credits. For theory internal credit, student has to appear for 01 class test (15 marks) and 01 assignment (10 marks). Every lab course has 02 credits which are split as 01 external credit and 01 internal credit. For lab internal credit, the student has to submit Laboratory Book (05 marks) and remaining 20 marks are for the Lab activities carried out by the student throughout the semester. For lab external credit, 20 marks are reserved for the examinational experiment and05 marks are for the oral / viva examinations.

The open elective has 04 credits which are purely internal. If students are opting for MOOCs as open elective , then, there must be a Faculty designed as MOOCs course coordinator who shall supervise learning through MOOCS. This is intentionally needed as the MOOCs course coordinator shall verify the MOOC details including its duration, staring date, ending date, syllabus contents, mode of conduction, infrastructure feasibility, and financial feasibility during start of each semester. This is precautionary as the offering of the MOOCs through online platforms are time specific and there must be proper synchronization of semester duration with the MOOCs duration. Students must opt for either institutional / college level open elective or a course from University recognized MOOCs platforms as open electives.

The number of hours needed for completion of theory and practical courses as well as the passing rules, grading patterns, question paper pattern, number of students in practical batches, etc shall be as per the recommendations, norms, guidelines and policies of the UGC, State Government and the SRTM University currently operational. The course structure is supplemented with split up in units and minimum numbers of hours needed for completion of the course, wherever possible.

Under the CB.SC IT pattern, students would graduate **B.Sc. Information Technology** with a minimum number of required credits which includes compulsory credits from core courses, openelectives and program specific elective course. All students have to undergo lab / practical activities leading to specific credits and project development activity as a part of professional UG program.

1. **B.Sc. Information Technology** Degree / program would be of 144 Credits. Total credits per semester= 24
2. Each semester shall consist of three core courses, one elective course, one open elective course and two practical courses. Four theory courses (core+elective) = 16 Credits
3. Two practical / Lab courses= 4 Credits in total (02 credits each) , One Open elective= 4 credit
4. One Credit = 25 marks , Two Credits = 50 Marks, Four Credits = 100 Marks

PEO, PO and CO Mappings

1. **Program Name** : B.Sc.(Computer Science)

2. **Program Educational Objectives**: After completion of this program, the graduates / students would

PEO I :Technical Expertise	Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO II : Successful Career	Deliver professional services with updated technologies in **Information Technology** based career.
PEO III :Hands on Technology and Professional experience	Develop leadership skills and incorporate ethics, team work with effective communication & time management in the profession.
PEO IV :Interdisciplinary and Life Long Learning	Undergo higher studies, certifications and research programs as per market needs.

3. **Program Outcome(s):** Students / graduates will be able to

PO1: Apply knowledge of mathematics, science and algorithm in solving Computer problems.
PO2: Generate solutions by conducting experiments and applying techniques to analyze and interpret data
PO3: Design component, or processes to meet the needs within realistic constraints.
PO4: Identify, formulate, and solve problems using computational temperaments.
PO5: Comprehend professional and ethical responsibility in computing profession.
PO6: Express effective communication skills.
PO7: Recognize the need for interdisciplinary, and an ability to engage in life-long learning.
PO8: Actual hands on technology to understand it's working.
PO9: Knowledge of contemporary issues and emerging developments in computing profession.
PO10: Utilize the techniques, skills and modern tools, for actual development process
PO11: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings in actual development work
PO12: Research insights and conduct research in computing environment.

4. **Course Outcome(s):** Every individual course under this program has course objectives and course outcomes (CO). The course objectives rationally match with program educational objectives. The mapping of PEO, PO and CO is as illustrated below

5. **Mapping of PEO& PO and CO**

Program Educational Objectives	Thrust Area	**Program Outcome**	Course Outcome
PEO I	Technical Expertise	PO1,PO2,PO3,PO6	All core courses
PEO II	Successful Career	PO4,PO5,PO11,	All discipline specific electives courses
PEO III	Hands on Technology and Professional experience	PO8,PO10	All Lab courses
PEO IV	Interdisciplinary and Life Long Learning	PO7,PO9,PO12	All open electives and discipline specific electives

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
CHOICE BASED CREDIT SYSTEM (CBCS IT)
SEMESTER PATTERN
Faculty of Science & Technology
Under Graduate (UG) Programmes

Program: B.Sc. Information Technology w.e.f AY 2023-2024

Year	Semester	Course category	Course Code	Course Title	Credits * *(split up will be given separately)
First	**First**	Core Course	B.SC IT-101	Fundamental of IT	04
		Core Course	B.SC IT-102	Web Page Design	04
		Core Course	B.SC IT-103	Programming in C	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-104 A	Numerical Ability	04
			B.SC IT-104 B	Digital Marketing	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-105 A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-105 B	Communication Skills	
		Lab / Practical	B.SC IT-106	Web Page Design	02
			B.SC IT-107	Programming in C	02
Total					**24**
First	**Second**	Core Course	B.SC IT-201	RDBMS through ORACLE	04
		Core Course	B.SC IT-202	OOP's with JAVA	04
		Core Course	B.SC IT-203	Computer Network	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-204A	Logical Reasoning	04
			B.SC IT-204B	8085 Microprocessor	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-205A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-205B	Functional English	
		Lab / Practical	B.SC IT-206	RDBMS	02
			B.SC IT-206	OOP's with JAVA	02
Total					**24**
For skill enhancement, if any, in all semesters, online course with internal credits is mandatory					

Year	Semester	Course category	Course Code	Course Title	Credits * *(split up will be given separately)
Second	**Third**	Core Course	B.SC IT-301	Analyzing data with SQL	04
		Core Course	B.SC IT-302	Advanced Java	04
		Core Course	B.SC IT-303	Data Structure	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-304 A	Software Engineering	04
			B.SC IT-304 B	Operating System	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-305 A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-305 B	JavaScript	
		Lab / Practical	B.SC IT-306	Analyzing data with SQL	02
			B.SC IT-307	Advanced Java	02
Total					**24**
Second	**Fourth**	Core Course	B.SC IT-401	Web development with PHP and MySQL	04
		Core Course	B.SC IT-402	Hibernate and Spring Framework	04
		Core Course	B.SC IT-403	Software Testing	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-404A	Cloud Computing	04
			B.SC IT-404B	Linux Fundamental	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-405A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-405B	Content Management System	
		Lab / Practical	B.SC IT-406	PHP and MySQL	02
			B.SC IT-406	Hibernate and Spring Framework	02
Total					**24**
For skill enhancement, if any, in all semesters, online course with internal credits is mandatory					

Year	Semester	Course category	Course Code	Course Title	Credits * *(split up will be given separately)
Third	**Fifth**	Core Course	B.SC IT-501	Python Programming	04
		Core Course	B.SC IT-502	Data Analysis with PowerBI	04
		Core Course	B.SC IT-503	Programming in C#	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-504 A	Introduction to AI and ML	04
			B.SC IT-504 B	ReactJS	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-505 A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-505 B	Cyber Security	
		Lab / Practical	B.SC IT-506	Python Programming	02
			B.SC IT-507	Data Analysis with PowerBI	02
Total					**24**
Third	**Sixth**	Core Course	B.SC IT-601	Python for Data Science	04
		Core Course	B.SC IT-602	ASP.Net Core	04
		Core Course	B.SC IT-603	Project	04
		Chose any one from the below Elective courses			
		Elective Subject	B.SC IT-604A	Computer Vision	04
			B.SC IT-604B	Introduction to IOT	
		Chose any one Open Elective courses			
		Open Elective	B.SC IT-605A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			B.SC IT-605B	MongoDB	
		Lab / Practical	B.SC IT-606	Python for Data Science	02
			B.SC IT-607	ASP.Net Core	02
Total					**24**
For skill enhancement, if any, in all semesters, online course with internal credits is mandatory					

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Fundamentals of IT**
Subject Code	**B.Sc IT-101**
Lectures	**50 Lectures**

Objectives

Through this paper Student should learn basic principles of computer. The paper is designed to aim at importing basic level of Computer.

Outcome

To learn Basic Function of Devices like I/O, HDD etc. To Understand the Fundamental of Software and Hardware. Understand the Concept of Operating System and Network.

Unit I

1. Introduction to Computer and History **15 Lectures**

1.1 Definition of Computer
1.2 Basic Computer Organization
1.3 Characteristics of Computer
1.4 Generations of Computer
1.5 Types of Computer: - Personal Computer, Microcomputer, Minicomputer, Mainframe Computer, Workstations, Client and Server

Unit II

2. Computer Peripherals & Memory **10 Lectures**

2.1 Input Devices :- Keyboard, Mouse, Trackball, Joystick, Light pen, Speech Recognition Devices
2.2 Output Devices :- Monitor, Printer, Projector, Biometric Devices
2.3 Computer Memory :- RAM, ROM, Cache Memory

Unit III

3. Storage Devices and Operating System **15 Lectures**

3.1 Compact Disk, Digital Versatile Disk
3.2 Hard Disk Drive
3.3 USB Flash Drive
3.4 Memory Card
3.5 Definition of operating System
3.6 Types of Operating System
3.7 Disk Operating System
3.8 Windows Operating System
3.9 Linux Operating System
3.10 Android Operating System

Unit IV

4. Introduction to Computer Network & Internet 10 Lectures

4.1 Definition of Network
4.2 Types of Network :- LAN,MAN,WAN
4.3 Data Transmission Modes
4.4 OSI Model
4.5 E-Mail
4.6 File Transfer Protocol
4.7 Web Browser
4.8 Types of Web Browser
4.9 Internet and Intranet

References:-

1 Fundamental of Computer –5th& 6th Edition, P.K.Sinha, BPB Publication
2 Fundamental of Computer - V. Raja Raman, PHI Publication

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Web Page Design**
Subject Code	**B.Sc IT- 102**
Lectures	**50 Lectures**

Objectives:

To improve the skill to create the static web page.

To develop the ability to create the dynamic web pages.

To enhance the ability of Insert a graphic within a web page.

To improve the skills to Create, validate and publish a web page.

Outcome:

At the end of the course, students should be able to: Design and implement dynamic websites with good aesthetic sense of designing

UNIT – I

1. Introduction of HTML Documents 15 Lectures

1.1 Overview of HTML and WWW
1.2 Concept of Webpage and Website,
1.3 Structure of HTML documents
1.4 Formatting Tags: Headings Tags, Paragraph Tags, Break, Bold & strong, small, Italic, Underline, subscript, Superscript, strikethrough, center tags.
1.5 Types of List tags, HR Tag, FONT Tag,
1.6 DIV tag, SPAN tag, ADDRESS tag,
1.7 MARQUEE tag.
1.8 Meta Tag.

UNIT – II

2. Technologies for Web Application 10 Lectures

2.1 Web browser, Web server
2.2 Web protocols: HTTP, FTP.
2.3 Hyperlink (Anchor) Tag & it's all attributes,
2.4 Images In HTML.
2.5 Tables in HTML.

UNIT – III

3. Basic Interactivity and DHTML 15 Lectures

3.1 Frames in HTML:- Rows, Cols,
3.2 Iframe:- Embed PDF Document and Google Map in webpage.
3.3 Form controls: Text Controls, Password Field, Number, Date and Time Control, Textarea Input,
   1. Email, URL, Check Box, Radio Buttons, Select control,
   2. Reset Button, Submit button and Button control.

UNIT – IV

4. CSS and Java Script 10 Lectures

4.1 Introduction to Cascading Style Sheets
4.2 Embedded Styles:- Inline, Internal, External Styles.
4.3 Introduction of JAVA Script
4.4 Adding script to documents with example. Variables.
4.5 Input and Output statements of JAVA Script
4.6 Roll Over Button.

Reference Books:

1. HTML The complete Reference (2nd Edition Thomas A Powel Tata McGraw Hill publication)
2. The complete Reference (HTML & XHTML)- 5th Edition Thomas A Powel Tata McGraw Hill publication

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Programming in C**
Subject Code	**B.Sc IT- 103**
Lectures	**50 Lectures**

Objectives of C-Programming:

1. Introduce students to the fundamentals of programming using the C language.
2. Teach students about variables, data types, and operators in C.
3. Familiarize students with control structures such as loops and conditionals in C.
4. Emphasize best practices for writing efficient and maintainable C code.
5. Develop students' problem-solving skills through programming exercises and projects.

C -programming Outcomes:

1. Gaining solid knowledge of the C programming language, including its syntax, data types
2. Studying programming language structures.
3. Studying various keywords to use in programming.
4. Using operators and control statements, create programmes.
5. To describe a structure, an array, a string, and a function.

Unit I: Fundamentals and Basics of C Programming

- Computer Languages (Low Level, High Level, Language Translators.)
- Algorithm, Flowchart.
- Features and History and Application areas of C Language.
- Tokens, Character set.
- Structure of a ‘C’ program.
- Variables, Constants, Data Types.
- Operators and Its types, (Operator precedence and Order of evaluation.)
- Formatted input and output (Character, String)

Unit II: Control Structures & Functions

- Control Structures
  - Decision making structures: - if, if-else, else-if ladder, switch -case
  - Loop control structures: - while, do while, for.
  - Use of break and continue.
  - Unconditional branching (goto statement).
  - Functions
  - Functions and its advantages
  - declaration, definition, function call, parameter passing (by value), passing by references,
  - return statement.
  - Types of Function.

- Recursive functions.
- Scope of variables

Unit III Arrays & String

- Arrays
- Concept of array.
- Types of Arrays – One, Two and Multidimensional array.
- Array Operations - declaration, initialization, accessing array elements.
- String
- Declaration and initialization of String.
- Standard library functions.
- Array of strings.

Unit IV Structure & Pointer

- Creating structures.
- Accessing structure members (dot Operator)
- Array of structures.
- Pointers and structures.
- What is Pointer?
- Pointer declaration,
- initialization Pointer to pointer
- Arrays and pointers
- Functions and pointers

References:

1. Structured Programming approach using C – Forouzan and Gilberg, Thomson learning publications
2. The C Programming language – Kernighan and Ritchie
3. Complete C Reference – Herbert Schildt
4. Pointer in C – YeshwantKanetkar

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Numerical Ability**
Subject Code	**B.Sc IT- 104A**
Lectures	**50 Lectures**

Course Objective: -

To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of campus placements and competitive examinations.

Course Outcomes: -

1. Solve mathematical problems using analytical methods;
2. Solve mathematical problems using computational methods;
3.Students can develop design and analyze numerical techniques to approximate solutions to problems.

Unit I : Introduction of Number system	Hours
1. **Numbers:** Types of numbers, Divisibility tests of numbers, Formulas for sum of natural numbers, arithmetic progression, Examples for practice. 2. **HCF and LCM** : Methods of calculating highest common factor and greatest common divisor, factorization method, Division method, Finding HCF and LCM more than two numbers, LCM factorization method, Division method, Finding HCF and LCM more than two numbers, LCM and HCF of fractions and decimal numbers, Applications of LCM and HCF.	10
Unit II : Average & Problem on ages	10
1. **Average:** Definition of average, Formulae and theoretical problem on average. **2. Problem on ages:** simultaneous equations and their applications, Theoretical problems on ages, Theoretical problems on numbers.	
Unit III: Percentage, Profit & Loss	10
1. **Percentage:** Concept of percentage, Application of percentage, Results on populations, Result on depreciations, Theoretical problem on percentage. 2. **Profit and Loss**: Definition of cost price, selling price and profit, Formulae of profit and loss, Theoretical problems on profit and loss.	
Unit IV: Time-Speed-Distance, Problems on Trains	10
1. **Time and Distance**: Concept of time and distance, Formulae of time and distance, Theoretical problems on time and distance. 2. **Problems on Train:** Formulae of problems on train, Theoretical problems on train.	

References: -

1)Quantitative Aptitude by Dr.R.SAggrawal , S. Chand and Company Publications
2)Quantitative Aptitude by AbijitGuha, Tata McGraw Hill Publications

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Digital Marketing**
Subject Code	**B.Sc IT- 104B**
Lectures	**50 Lectures**

Objectives:
1. Give a brief introduction to digital marketing and explain why it is important in the current digital environment.
2. Introduce several digital marketing channels, including display advertising, email marketing, social media marketing, email marketing, and content marketing.
3. Teach methods for finding target audiences and segmenting them according to their demographics, interests, behaviours, and other pertinent characteristics.
Outcomes:
1. To study the Digital Marketing Concepts.
2. Understanding of Digital Channels.
3. Visibility in Search Engines.
4. Studying the Competence in social media marketing.
5. To study the email marketing.
6. Capabilities in content creation and distribution.

Unit. No.	Particulars
1	Introduction to Digital Marketing • Digital Marketing: Introduction and meaning, • Advantages of digital marketing, • Difference between digital marketing and traditional marketing • Discussion on E-Commerce • ROI Between Digital and traditional Marketing
2	E- Marketing • E Marketing: Concept of E-marketing • History of E-marketing, • Objectives ofE-marketing, • Limitations of E-marketing • What is Website? • Understanding Website • Difference Between Blog, Portal and Website • Difference Between Website either Static or Dynamic

3	Social Media Marketing • Social Media Marketing: Concept of social media • Facebook, Twitter, WhatsApp, Instagram, LinkedIn Marketing • Advantages of social media and uses to business. • Additional Module : E-Mail Marketing, Affiliate Marketing
4	Methods and Techniques of E-Marketing • Methods and Techniques of E-Marketing: Introduction and Objectives • Sponsorship Techniques • Direct Marketing Techniques • Merchandising Techniques • Online Seminar Techniques • Word-of-Mouth Marketing Techniques.

Reference Books:

1. Digital Marketing- Kamat and Kamat –Himalaya
2. Digital Marketing – S.Gupta McGrew-Hill
3. Marketing Strategies for engaging the Digital Generation, D.Ryan
4 Digital Marketing- V.Ahuja, Oxford University Press

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Communication Skills**
Subject Code	**B.SC IT-105 B**

Course Objectives:

1. To develop communicative skills of the learners in listening, speaking, writing and reading.
2. To develop fluency in conversation and efficiency in interactional skills
3. To learn to use grammar communicatively so that they become effective and efficient
4. communicators in English.

Course Outcomes:

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-I- Morphology		**10 Lectures**
1.1	Morphology: Free & Bound Morpheme	
1.2	Word Formation Processes	
1.3	Morphological Analysis of words	
Unit- II- A. Grammar in day-to-day use:		**15 Lectures**
2.1	Word Classes: Open and Closed Word Classes	
2.2	Phrase: Types and functions of the phrases	
2.3	Basic sentence structures	
Unit-III- Communication		**10 Lectures**
3.1	Concept	
3.2	Methods (verbal & non-verbal)	
3.3	Barriers to communication	
Unit-IV- Career Skills		**10 Lecture**
4.1	Group Discussion	
4.2	Resume Building	
4.3	Personal Interview	

Reference Books:

1. Developing of Communication Skills -Krishna Mohan & Meera Banerji
2. A Practical English Grammar A.J. Thomson -Oxford
3. Mastering English Grammar – S.H.Burton
4. Technical Communication- Raman Sharma- Oxford
5. Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6. A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Web Page Design (Lab/Practical)**
Subject Code	**B.Sc IT- 106**

Note - Any 15 practical from the syllabus

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**I**
Name of Subject	**Programming in C (Lab/Practical)**
Subject Code	**B.Sc IT- 107**

Note - Any 15 practical from the syllabus

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**RDBMS through Oracle**
Subject Code	**B.Sc IT- 201**
Lectures	**50 Lectures**

Course Objectives:
1. To understand the features of Relational database.
2. To describe data models and schemas in DBMS.
3. To use SQL- the standard language of relational databases for database operations.
4. To understand the functional dependencies and design of the databases.

Course Outcome:
1. To study the basic concepts of relational databases
2. Learn and practice data modeling using the entity-relationship and developing database designs.
3. Understand the use of Structured Query Language (SQL) and learn SQL syntax for writing queries.
4. Apply normalization techniques to normalize the databases.

Unit – I Introduction and Basic Concepts (Lectures – 7)
1.1 Structure of DBMS
1.2 Advantages and Disadvantages of DBMS
1.3 Users of DBMS
1.4 Relational Database: Entities, Attributes and Domains
1.5 Tuples, Relations and their schemes.

Unit – II SQL Statements & Working with Tables (Lectures – 10)
2.1 What is SQL?
2.2 Types of SQL Commands (DDL, DML, DQL, DCL, TCL
2.3 Data types in SQL
2.4 Creating Tables tables
2.5 WHERE Clause tables, DISTINCT Clause
2.6 Column aliasing
2.7 Manipulation Table data
2.8 Altering Table structure
2.9 Data Constraints

Unit – III. Operators & SQL Functions & Views (Lectures – 7)
3.1 Arithmetic Operators, Relational Operators
3.2 Comparison Operators
3.3 LOGICAL Operators
3.4 SQL Functions: Single Row Functions, Multiple Row Functions
3.5 Views

Unit – IV. **Sorting & Grouping Data and Joining Tables & Sub queries in ORACLE (Lectures – 7)**

4.1 What is sorting?
4.2 ORDER BY & GROUP BY & GROUP BY HAVING Clauses
4.3 What is Join? Join Styles: Theta, ANSI, Using clause
4.4 Types of Joins: Equi Joins, Non Equi Join, Outer Join: Left, Right, Full, Self-Join, Cross Join
4.5 Joining three tables
Sub queries
4.6 PL/SQL Overview
4.7 Declarations Section
4.8 Executable Commands Section
4.9 Exception Handling Section

References-

1. "Oracle Database 10g PL/SQL Programming" by Scott Urman , Ron Hardman, MichaleMc Laughlin, Oracle Press, TMH, ISBN-0-07-059779-0.
2. "Oracle Database 10g The Complete Reference" By Kevin Loney, Bob Bryla Oracle
3. SQL, PL/SQL the programming language of ORACLE 4th Edition by Ivan Bayross

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**OOPs with JAVA**
Subject Code	**B.Sc IT- 202**
Lectures	**50 Lectures**

Learning Objectives:

- To understand the basic concepts and fundamentals of platform independent object oriented language.
- To demonstrate skills in writing programs using exception handling techniques and java 8 features.
- To understand streams and efficient user interface design techniques.

Course Outcomes:

After successful completion of this course, students should be able to:

- Use the syntax and semantics of java programming language and basic concepts of OOP.
- Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages
- Apply the concepts of Exception handling to develop efficient and error free codes.

i. Use java standard API library to write complex programs

Unit I: Java Fundamentals	Hours
Java History, Java Architecture, Java Vs. C++, Java Program Structure, Command Line Arguments, Data Types, Variables, Operators, Flow Control Statements, Arrays	10
Unit II OOPS	12
Classes and Objects, static members, Constructors, Encapsulation, Inheritance, this and super keyword, Polymorphism, Garbage Collection	
Unit III: Abstraction and Packages	10
Abstract class and Abstract Methods, Interfaces, Final Keyword, System Packages, User defined Packages, static impor	
Unit IV Exception Handling and Strings	10
Introduction to Exception Handling, Exception Types, Try and catch block, finally clause, throws and throw clause, user defined exceptions, String and StringBuffer class ArrayList, Generics, Iterator, Comparable, TreeSet, HashSet, HashMap, TreeMap, Introduction to IO streams, Byte Stream Classes, Character Stream Classes, IO operations, Object Serialization	

References:

1. Java The Complete Reference 9th Edition, Herbert Schildt, McGraw Hill Education (India) Private Limited, New Delhi.
2. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
3. Introduction to Java programming, By Y.DanielLiang,Pearson Publication
4. An introduction to Java programming and object oriented application development, R. A. Johnson-Thomson
5. Understanding OOP with Java, up dated edition, T.Budd, Pearson education.

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**Computer Network**
Subject Code	**B. Sc IT-203**
Lectures	**50 Lectures**

Course objective:-
- Introduction fundamental concepts of computer networking.
- Introduce students with various concepts used in network.
- Introduce various technologies and standards.
- Allow the student to gain expertise in areas of networking.

Course outcome:- After completing this course the student get the knowledge and ability to:
- Understand basic computer network technology.
- Students can identify the different types of network topologies and protocols.
- Students can Identify the different types of network standards.

Unit I

Introduction to Computer Networks **12 Lectures**

Definition & Applications of Computer Network
Network topologies- star, bus, mesh, ring
Data Transmission Media
Network Types LAN, MAN, WAN
Connection Oriented & Connectionless services

Unit II

Network Models and Devices **14 Lectures**

Network Models – OSI/ISO Reference Model & TCP/IP Model
Network Devices - NIC Cards, Hub, Switch, Bridges, Gateways, Repeaters Router.
Service Primitives - listen, connect, receive, send, disconnect

Unit III

Multiplexing, Switching and Protocols **12 Lectures**

Multiplexing – Time division and Frequency division
Switching - Circuit Switching, Packet Switching, Message Switching
Transmission Modes-Parallel Transmission, Serial Transmission – Asynchronous and Synchronous
Network Protocols- IP protocol, SMTP, FTP, HTTP

Unit IV

Internet and Network Standards **12 Lectures**

Internet verses Intranet
Internet Service Providers
E-mail – Architecture
IP-addresses
Network Standards – Ethernet10Base2, 10Base5, 10BaseT

Reference Books:

1) Andrew S. Tannenbaum," Computer Networks", (Third Edition), Prentice-Hall of India Pvt. Ltd, New Delhi.

2) Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill.

3) Gerd E. Keiser", Local Area Networks", Tata McGraw Hill Edition, New Delhi.

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**Logical Reasoning**
Subject Code	**B. Sc IT-204A**
Lectures	**50 Lectures**

Course Objective:

1. Understand and explain the importance of critical thinking
2. Identify the core skills associated with critical thinking
3. Construct a logically sound and well-reasoned argument
4. Demonstrate the difference between deductive and inductive reasoning

Course Outcome: -

1. Identify logical relations among statements.
2. Analyze logically complex statements into their truth functional or quantificational
3. components
4. This enable student to develop their ability to reason by introducing them to elements of
5. formal reasoning

Unit I : Series and Analogy	Hours
A. Series: Types of series, Alphabet series, Number Series, Alpha numeric series, Examples on continues pattern series. B. Analogy: Completing the Analogous Pair, Direct/Simple Analogy, Choosing the Analogous Pair, Double Analogy, Number analogy, Alphabet analogy, Correlation between letters/numbers.	10
Unit II : Coding-Decoding	
A. Coding-Decoding: Letter coding, Direct Letter Coding, Number/Symbol Coding. B. Substitution: Concept of substitution, Problem solving by using substitution. C. Deciphering: Deciphering messages word codes, Deciphering numbers/symbol codes for messages	10
Unit III: Direction Sense Test	6
A. Introduction B. Problems based on angular changes in direction C. Problems on Shadows D. General Problems based on Pythagoras Theorem	
Unit IV: Seating or Placing Arrangement	6
A. Problems based on linear and circular based arrangement.	

References :-

1. A Modern Approach to Verbal & Non-Verbal Reasoning Dr.R.SAggarwal S. Chand and Company Publications

2.Test of Reasoning Edgar Thorpe McGraw Hill Education

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**8085 Microprocessor**
Subject Code	**B. Sc IT-204B**
Lectures	**50 Lectures**

UNIT I

Microprocessor Architecture **10**

1.1 Introduction to 8085 Microprocessor
1.1.1 Features of 8085 Microprocessor
1.2 Block diagram of 8085 Microprocessor
1.2.1 ALU
1.2.2 Address/Data Bus
1.2.3 Timing and control unit
1.2.4 Registers
1.3 Pin configuration of 8085 Microprocessor
1.4 Opcode and Operand
1.5 Instruction Formats

UNIT II

Addressing Modes and Instruction Cycle **10**

2.1 Addressing modes:
2.1.1 Register Addressing
2.1.2 Direct Addressing
2.1.3 Indirect Addressing
2.1.4 Immediate Addressing
2.1.5 Implicit Addressing
2.2 Instruction Cycle
2.2.1 Fetch cycle
2.2.2 Execute cycle
2.2.3 Machine cycle

UNIT III

Instruction Set of 8085 Microprocessor **15**

3.1Introduction to instruction set of 8085
3.2 Data Transfer Group of instruction
3.3 Arithmetic Group of instruction
3.4 Logical group of instruction
3.5 Branch Control Group of instruction
3.6 Machine and I/O Control Group of instruction

UNIT IV

Programming of 8085 Microprocessor **15**

4.1 Introduction
4.2 Assembly Language Programming

References:

1. Fundamentals of MICROPROCESSOR and Microcomputer -by B. Ram publication 5th Edition

Name of Course	**Bachelor of Science (Computer Management)**
Semester	**II**
Name of Subject	**Functional English**
Subject Code	**B.Sc IT- 205 B**

Course Objectives:

1. To develop communicative skills of the learners in listening, speaking, writing and
2. reading.
3. To develop fluency in conversation and efficiency in interactional skills
4. To learn to use grammar communicatively so that they become effective and efficient
5. communicators in English.

Course Outcomes:

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-I- Day-to-Day-English		**10 Lectures**
1.1	Giving Self-Introduction	
1.2	Narrating Pictures/events	
1.3	Giving Opinions- Agreeing and Disagreeing	
Unit-II- Presentation Skills		**15 Lectures**
2.1	Concept	
2.2	Elements of Presentation	
2.3	Effective Presentation	
Unit-III- Writing Skills		**15 Lectures**
3.1	Curriculum Vitae	
3.2	Email Writing	
3.4	Essay Writing	
Unit-IV- Phonetics		**10 Lectures**
4.1	Phonemes-	
4.2	English Vowels and Consonants	
4.3	Phonetic Transcription of the words	

Reference Books:

1) Better English Pronunciation-J. D. O'connor (Cambridge Publication)

2) Business Communication-Urmila Rai And S. M. Rai (Himalaya Pub House)
3) Business Communication-Dr. V .K .Jain (S Chand Publication)
4) English For Practical Purposes- Z .N .Patil (Macmillan India Ltd.)

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**RDBMS (Lab/Practical)**
Subject Code	**B.Sc IT- 206**

Note - Any 15 practical from the syllabus

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**II**
Name of Subject	**OOPs with JAVA (Lab/Practical)**
Subject Code	**B.Sc IT- 207**

Note - Any 15 practical from the syllabus

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**Analysing data with SQL**
Subject Code	BSc IT- 301
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Course Objectives:
To understand Analysing DATA with SQL
To understand SELECT Statement
To understand Database concepts.
Course Outcomes:
Ability to learn various Analysing DATA with SQL
Ability to learn various commands of RDBMS.
Ability to learn Database concepts & PL/SQL Language.
Ability to understand the Database and functions in SQL.

UNIT I : Retrieving Data Using the SQL SELECT Statement

1.1 Basic SELECT Statement
1.2 Selecting All Columns, Selecting Specific Columns
1.3 Arithmetic Expressions, Using Arithmetic Operators
1.4 Operator Precedence
1.5 Defining a Null Value, Null Values in Arithmetic Expressions
1.6 Displaying the Table Structure
1.7 Using the DESCRIBE Command

Unit II: Restricting and Sorting Data

2.1 Limiting Rows Using a Selection, Using the WHERE Clause
2.2 Comparison Operators: - BETWEEN Operator, IN Operator, LIKE Operator, Using the NULL Conditions.
2.3 Defining Conditions Using the Logical Operators: AND, OR, NOT.
2.4 What is sorting
2.5 Using the ORDER BY Clause, Sorting
2.6 Substitution Variables
2.7 Using the DEFINE Command, Using the VERIFY Command.

UNIT III: Using Single-Row Functions to Customize Output

3.1 Single Row Function**,** Character Functions
3.2 Case-Conversion Functions, Character-Manipulation Functions
3.3 Using the Character-Manipulation Functions, Number Functions
3.4 Using the ROUND Function, Using the TRUNC Function
3.5 Using the MOD Function
3.6 Working with Dates:- RR Date Format, Using the SYSDATE Function
3.7 Date-Manipulation Functions, Using Date Functions
3.8 Using ROUND and TRUNC Functions with Dates

Unit IV: Using Conversion Functions and Conditional Expressions

4.1 Conversion Functions, Implicit Data Type Conversion, Explicit Data Type Conversion
4.2 Using the TO_CHAR Function with Dates
4.3 Elements of the Date Format Model,
4.4 Using the TO_CHAR Function with Numbers, Using the TO_NUMBER and TO_DATE Functions
4.5 General Functions: - NVL Function, Using the NULLIF Function, Using the COALESCE Function
4.6 Conditional Expressions, CASE Expression, DECODE Function.

UNIT V: Reporting Aggregated Data Using the Group Functions

5.1 What Are Group Functions?
5.2 Using the AVG and SUM Functions
5.3 Using the MIN and MAX Functions,
5.4 Using the COUNT Function
5.5 Using the DISTINCT Keyword
5.6 Creating Groups of Data: GROUP BY Clause Syntax, Using the GROUP BY Clause on Multiple Columns
5.7 Illegal Queries Using Group Functions
5.8 Restricting Group Results with the HAVING Clause.

UNIT VI: Retrieving Data by Using Subqueries

6.1 Writing a multiple-column subquery
6.2 Multiple-column comparisons involving subqueries can be: Nonpairwise comparisons, Pairwise comparisons
6.3 Solving problems with correlated subqueries
6.4 Using the EXISTS and NOT EXISTS operators
6.5 Using the WITH clause

Reference Book.

1. “Oracle Database 10g PL/SQL Programming” by Scott Urman , Ron Hardman,
MichaleMc Laughlin, Oracle Press, TMH, ISBN-0-07-059779-0.
2. “Oracle Database 10g The Complete Reference” By Kevin Loney, Bob Bryla Oracle
Press (TATA McGraw Hill Edition) ISBN-13:978-0-07-059425-8, ISBN-10: 0-07-
059425-2
3. SQL, PL/SQL the programming language of ORACLE 4th Edition by Ivan Bayross
ISBN-81- 7656964-X

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**Advanced Java**
Subject Code	BSc IT- 302
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Learning Objectives:

i To Design and build robust and maintainable web applications.

ii To create dynamic HTML content with Servlets and Java Server Pages, using the JSP Standard Tag Library (JSTL).

iii To Make Servlets and JSP work together cleanly.

Course Outcomes:

After successful completion of this course, students should be able to:

i. Create dynamic and interactive web sites and interaction with client and server.

ii. Do server side programming with java Servlets and JSP.

iii. Implement different data structure using collection framework.

Unit I: Multithreading	Hours
Introduction to multithreading, Creating Threads, Thread Life Cycle, Thread Priorities, Thread Synchronization	10
Unit II: Collection Framework	12
Collection interface, ArrayList, Vector, Generics, Iterator, Comparable, TreeSet, HashSet, HashMap, HashTable, TreeMap	
Unit III Java Database Connectivity	8
JDBC Introduction, JDBC Architecture, JDBC Drivers, Establishing Connection, Executing Query and Processing Results, Metadata, Prepared Statement, Callable Statement	
Unit IV Introduction to Servlets	Hours
Introduction to Servlets, Deploying Simple Servlet, Servlet Life Cycle, Get and Post Requests, Request Object	8
Unit V: Handling Form Data	Hours
Accessing Data from HTML Form, Using JDBC in Servlet, Servlet Chaining, Cookies and Sessions	10
Unit VI JSP	Hours
Introduction to JSP, Scripting Elements- Expressions, Scriptlets, Declarations, Directives, Sessions in JSP, Using JDBC in JSP, JavaBeans in JSP	12

References:

1 Java The Complete Reference 9th Edition, Herbert Schildt, McGraw Hill Education
2 (India) Private Limited, New Delhi.
3 Java Servlet & JSP Cookbook, Bruce W. Perry, O'Reilly Publication.

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**Data Structure**
Subject Code	BSc IT- 303
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Data Structure Objectives

- To teach the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs
- To understanding about writing algorithms and step by step approach in solving problemswith the help of fundamental data structures

Data Structure Outcome

- Ability to analyze algorithms and algorithm correctness.
- Ability to summarize searching and sorting techniques
- Ability to describe stack, queue and linked list operation.
- Ability to have knowledge of tree and graphs concepts.

Unit I

1. **Introductions and Overview:**
   1.1 Introduction
   1.2 Basic terminology: elementary data organization
   1.3 Data structure and its types
   1.4 Data structure operations
   1.5 Notation and Concept of algorithm
   1.6 Complexity, time space tradeoff

Unit II

2. **Array, Searching and Sorting:**
   2.1 Linear array
   2.2 Representation of linear array in memory
   2.3 Traversing linear array
   2.4 Inserting and Deleting
   2.5 Searching methods (Binary and linear search)
   2.6 Sorting Methods ((Bubble Sort, Selection Sort, and Insertion sort)

Unit III

3. **Linked list :**
   3.1 Introduction to Linked list

3.2 Representation of Linked list in memory
3.3 Traversing a linked list ,
3.4 Searching a linked list
3.5 Memory allocation, Garbage collection
3.6 Insertion and deletion in linked list
3.7 Two way linked list

Unit IV

4. Stacks, Recursion:
Lectures
4.1 Introduction
4.2 Stacks
4.3 Array representation of stacks
4.4 Operations on Stack
4.5 Arithmetic expression: Polish Notation
4.6 Infix, Prefix and Postfix
4.7 Evaluation of postfix expression
4.8 Recursion: Factorial, Fibonacci

Unit V

5. Queue
5.1 Introduction
5.2 Queues
5.3 Linked Representation of Queue
5.4 Insertion & Deletion on Queue
5.5 Dqueue
5.6 Priority Queue.

Unit VI

6. Tree and Graph:
6.1 Introduction
6.2 Terminology of Binary tree
6.3 Types of Binary tree
6.4 Traversing of binary tree
6.5 Header Nodes, Threads
6.6 General Tree Introduction
6.7 Graph Theory Terminology
6.8 Sequential representation of graph

References:-

1.Data Structure, By Seymour Lipschutz (Schaum's Ouline Series Incomputers) – McgrawHill.

2.An Introduction To Data Structurewith Application By Jeanpaul, Tremblay Paul, G.Sorenson (Tatamcgraw Hill)

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**Software Engineering (Open Elective)**
Subject Code	BSc IT- 304 A
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Prerequisites:

- Adequate knowledge of programming languages.
- Must know the mathematical functions for developing and maintaining the mathematical algorithms.

Course Objectives:

- To develop software engineering skills and testing plans.
- To understand system concepts and its application in Software development.
- To enhance skills of designing and testing software.
- To learn technical skills to assure production of quality software.

Course Outcomes:

- Ability to learn various methods of software development.
- Ability to apply various software testing techniques.

Salient Features:

- Improve your skills & build Confidence.
- Ability to understand the problem and find solutions.
- Lifelong learning and readily adapt to new software engineering environments.

Unit	NOS	Hours
Unit-I Introduction to Software Engineering • The Evolving Role of Software • Software • Software Characteristics • Software Applications • Software Evolution • Software Crisis & Horizon • Software Myths		**10**
Unit-II Process Of Software • Software Engineering • Software Process • The Waterfall Model • Incremental Process Models • Evolutionary Process Models • Spiral Model		**9**

Unit-III A Generic View of Process • Software Engineering – A Layered Technology • Process Framework • Personal and Team Process Models • Personal Software Process (PSP) • Team Software Process (TSP) • Process Technology • Product and process		**8**
Unit-IV AGILE DEVELOPMENT • What Is Agility? • What Is an Agile Process? • The Politics of Agile Development • Agile Process Models • Feature Driven Development (FDD)		**9**
Unit-V Software Engineering Practice • Software Engineering Practice • The Essence of Practice • Core Principles • Communication Practices • Planning Practices • Modeling Practices • Analysis Modeling Principles • Design Modeling Principles		**10**
Unit-VI System Engineering • Computer-Based Systems • The System Engineering Hierarchy • System Modeling • System Simulation		**6**

References:

1. Software Engineering -A Practitioner's approach, Sixth Edition, Roger S. Pressman, McGraw-Hill Higher Education; (1 August 2007),ISBN-10: 0077227808

2. Software Engineering -A Practitioner's approach, Fifth Edition, Roger S. Pressman, McGraw-Hill Higher Education; (1 August 2005)

1. Software Engineering 7th / 8th Edition, IAN Sommerville, Pearson Edition

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**Operating System (Elective)**
Subject Code	BSc IT- 304B
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Operating System Objectives

Through this paper Student should learn fundamentals of OS design, including memory, processor, device, and data management with lots of discussion on the pros and cons of design choices and problem/question sets to make the reader think through design alternatives

Operating System Outcome

To understand the different Concept of Operating System.

Unit I Introduction **14 Lectures**

1.1 What operating system do?

1.1.1 User view, System view, defining OS.

1.2 An Operating system Resource manager

1.3 An Operating system- Process view point

1.4 Operating system– Hierarchical And Extended machine view

1.5 Multiprocessor Systems

1.6 Operating-System Services

Unit II: Memory Management **12 Lectures**

2.1 Single Contiguous Allocation
2.2 Introduction to Multiprogramming
2.3 Partitioned Allocation
2.4 Relocatable Partitioned Memory Management
2.5 Paged Memory Management
2.6 Demand- Paged Memory Management
2.7 Segmented Memory management

Unit III: Process Management **12 Lectures**

3.1 The Process Concept,
3.2 State Model
3.3 Job Scheduling
3.4 Process Scheduling technique-
3.4.1 FCFS,
3.4.2 SJF,
3.4.3 Priority scheduling,
3.4.4 Round Robin scheduling
3.5 Multiprocessor System, Context switch

Unit IV: Process Deadlocks **6 Lectures**

4.1 Introduction, Deadlock Characterization, Preemptable and Non-preemptable Resources
4.2 Resource – Allocation Graph, Conditions for Deadloc
4.3 Handling Deadlocks: Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance, Deadlock Detection (For Single and Multiple Resource Instances), Recovery From Deadlock (Through Preemption and Rollback)

Unit V: Device Management **6 Lectures**

5.1 Techniques for Device Management
5.2 Device characteristics- Hardware Consideration
5.3 Channels and Control Units
5.4 Device Allocation Consideration
5.5 I/O Traffic controller, I/O Scheduler, I/O Device Handlers
5.6 A Simple File System
5.7 General Model of a File System

Unit VI: File Management **6 Lectures**

6.1. File Overview: File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Single Level, two Level and Hierarchical Directory Systems, File System Layout.
6.2. Implementing Files: Contiguous allocation, Linked List Allocation, Linked List Allocation using Table in Memory, Inodes.
6.3. Directory Operations, Path Names, Directory Implementation, Shared Files
6.4. Free Space Management: Bitmaps, Linked List

References:

1. Operating Systems By William Stallings Publication
2. Operating Systems By Godbole
3. Operating Systems By John J. Donovan

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	**JavaScript (Elective)**
Subject Code	BSc IT- 305 A
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Learning Objectives:

I. Understand the JavaScript language & the Document Object Model.
II. Alter, show, hide and move objects on a web page.
III. Check information inputted into a form.
IV. Javascript allows programming to be performed without server interaction.
V. Javascript can respond to events, such as button clicks.
VI. Javascript can validate data before sending out a request.
VII. Javascript can adjust an HTML document for special effects.
VIII. Javascript can create cookies! Cookies can be used to store and retrieve information from the user's computer

Course Outcomes:

After successful completion of this course, students should be able to:

I. Students will be a Front-End website developer.
II. JavaScript ensures student to have a responsive, mobile-first website.
III. It paces up the development process by offering resources such as templates and themes, which can be customized according to the project needs.

Unit I: Overview to Javascript	Hours
What is JavaScript? The development workflow Selecting the right tools for the job Just enough HTML and CSS Understanding objects Understanding variables Making comparisons Understanding events	10
Unit II Introduction to JavaScript	12
Writing your first script Internal vs. external scripts Using comments in scripts	

Using the NoScript Creating alert dialogs Understanding conditional statements Getting confirmations from users Creating prompts for users Understanding functions Making links smarter Using switch/case statements Handling errors	
Unit III: JavaScript Language Essentials	10
Getting started Creating loops Passing values to functions Detecting objects Reading arrays Returning values from functions Writing arrays Building do and while loops Re-using functions	
Unit IV: Creating Rollovers and More	Hours
Creating a basic image rollover How to write a better rollover Creating a three-state rollover Making rollovers accessible and 508 compliant Making disjointed rollovers Creating slideshows Displaying random images	10
Unit V: Building Smarter Forms	Hours
Getting started Creating jump menus Creating dynamic menus Requiring fields Cross-checking fields Displaying more informative errors Verifying radio button selections Setting one field with another field Verifying email addresses	10
Unit VI: Handling Events and Cookies	Hours
Responding to window events Responding to mouse movements Responding to mouse clicks Responding to onBlur form events Responding to onFocus form events Responding to keyboard events	8

The DOM, Nodes, and Objects Working with Dates and Times	

References:

1 JavaScript: The Definitive Guide,David Flanagan, O'Reilly Media; 7th edition (14 May 2020),ASIN : B088P9Q6BB.

2 Eloquent JavaScript,Marijin Haverbake, 3rd Edition,ISBN-13: 978-1593279509

3 JavaScript: The Good Parts,Douglas Crockford,Shroff; First edition,ISBN-10 : 8184045220

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	Lab 1: Analysing data with SQL
Subject Code	BSc IT- 306
Marks Credit Points	75 Marks
Credit Points	2 Points
Note:- Any 15 practical's should be provide on given syllabus	

Name of Course	Bachelor of Information Technology
Semester	Third
Name of Subject	Lab 2: Advanced Java
Subject Code	BSc IT- 307
Marks Credit Points	75 Marks
Credit Points	2 Points

Learning Objectives:

i. To Design and build robust and maintainable web applications

ii. To Create dynamic HTML content with Servlets and JavaServer Pages, using the JSP Standard Tag Library (JSTL)

iii. To Make Servlets and JSP work together cleanly

Course Outcomes:

After successful completion of this course, students should be able to:

i. Create dynamic and interactive web sites and interaction with client and server.

ii. Do server side programming with java Servlets and JSP

iii. Implement different data structure using collection framework

Lab Work/ Practical List

Programs for the demonstration of all the concepts in Advanced Java.

1. Write a program to create multiple threads.
2. Write a program to demonstrate thread synchronization.
3. Write a java program to represent ArrayList class.
4. Write a program to demonstrate TreeSet.
5. Write a program to store user id and password using HashMap.
6. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations using Statement.
7. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations using PreparedStatement.
8. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations using CallableStatement.
9. Write a JDBC application which will interact with Database and perform the following task. 1) Create a store procedure which will insert one record into employee table. 2) Create a store procedure which will retrieve salary for given employee id. 3) Write a java application which will call the above procedure and display appropriate information on screen.
10. Write a java program that prints the meta-data of a given table.
11. Write down the program for testing the forward action for servlet collaboration.
12. Develop Real Time Login Application using Servlet and JDBC.
13. Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective table 5. Update records of particular table of database 6. Delete Records from table.
14. Write down the program in which input the two numbers in an html file and then display the

addition in JSP file.

15. Write down the Program for testing the include action tag in jsp.
16. Develop Student Registration Application using Servlet, JSP and JDBC.

Name of Course	B.Sc. Information Technology
Semester	IV
Name of Subject	Web Development with PHP and MySQL
Subject Code	B.Sc. IT -401
Marks	75
Lectures	50

Objectives:

- Learn Core-PHP, Server Side Scripting Language.
- Learn to design dynamic and interactive Web pages.
- Learn PHP-Database handling.

Outcomes:

- Able to design dynamic and interactive web pages, websites.
- Able to run PHP scripts on server and retrieve results.
- Able to handle databases like MySQL using PHP in web sites.

1. Introduction to PHP **10**

a) Basic Syntax, Lexical Structure of PHP
b) Sending Data to the Web Browser
c) Understanding PHP, HTML, and White Space
d) Writing Comments, What Are Variables?
e) About Constants
f) Data types

2. Programming with PHP **08**

a) Creating an HTML Form
b) Handling an HTML Form
c) Managing Magic Quotes
d) Conditionals and Operators
e) Validating Form Data
f) Looping statements
g) What Are Arrays?

3 String Manipulation and Regular Expression **08**

a) Creating and accessing String, Searching & Replacing String
b) Formatting, joining and splitting String, String Related Library functions
c) Use and advantage of regular expression over Inbuilt function

4. Creating Dynamic Web Sites **08**

a) Including Multiple Files
b) Handling HTML Forms with PHP Redux
c) Making Sticky Forms
d) Creating and Calling Your Own Functions

e) Variable Scope
f) Date and Time Functions

5. Using PHP with MySQL **08**
a) Connecting to MySQL and Selecting the Database
b) Executing Simple Queries
c) Retrieving Query Results
d) Ensuring Secure SQL
e) Counting Returned Records
f) Updating Records with PHP

6. Cookies and Sessions **08**
a) Using Sessions
b) Sessions and Cookies
c) Improving Session Security

References:
1. PHP and MySQL for Dynamic Web Sites: Visual Quickpro Guide Larry Ullman
2. Programming PHP Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre

Name of Course	Bachelor of Information Technology
Semester	Four
Name of Subject	Hibernate and Spring Framework
Subject Code	BSc IT- 402
Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

Learning Objectives:

i. To Access databases with JDBC and Hibernate.
ii. To Acquire knowledge on creation of software components using Spring Framework.
iii. To Learn safe and maintainable techniques for programming with AOP.
iv. To Understand REST, and use Spring MVC to build RESTful services.
v. To learn the creation of pure Dynamic Web Application using Spring MVC.
vi. To understand how to build complex UIs using Spring Boot.
vii. To be familiar with using Spring Boot starters and start.spring.io to easily create new applications.

Course Outcomes:

After successful completion of this course, students should be able to:

i. Implement the web based applications using JDBC and Hibernate.
ii. Implement web based applications using features of Spring Framework.
iii. Apply the concepts of server side technologies for dynamic web applications using Spring MVC.
iv. Use the core principles of Spring, and of Dependency Injection (DI) / Inversion of Control.
v. Integrate Spring MVC with technologies such as Hibernate.
vi. Learn how to build a simple MVC application using Spring Boot
vii. Configure database connectivity via Spring Boot

Unit I: ORM and Hibernate	Hours
Introduction to ORM Framework, ORM advantages, Hibernate Introduction, Hibernate Architecture, Hibernate Session, Hibernate SessionFactory, Hibernate Configuration, Mapping, Mapping with Annotations, Hibernate Aggregation, Hibernate Named Queries, Hibernate Native SQL, HQL-Hibernate Query Language	10
Unit II: Working with Hibernate Objects	12
Hibernate Object States, Insert Object, Retrive Object, CURD Operations, Hibernate with annotations, Hibernate Query Language, Criteria Query, Native SQL, Hibernate Mapping	

Unit III Introduction to Spring	8
Spring Features, Spring Architecture, Spring Core, Bean Configuration file, Inversion of Control, Dependency Injection, Auto Wiring	
Unit IV Spring MVC	Hours
MVC Overview, Introduction to Spring MVC, Work flow in Spring MVC, Components of Spring MVC, Spring Annotations, First Spring MVC Application	8
Unit V: Spring MVC and Hibernate	Hours
Spring MVC Form Handling, Spring MVC Application with Form Handling, Spring-Hibernate Application	6
Unit VI Introduction to Spring Boot	Hours
Overview of Spring Boot, Spring Boot Layers, Spring Boot Flow Architecture, Hello World example, Spring Boot Dependency Injection, Singleton Scope, Prototype Scope, Autowiring, Spring Boot Web App, Spring Boot MVC and JPA H2	12

References:

6. Beginning Hibernate: For Hibernate 5, Fourth Edition, Joseph B. Ottinger Jeff Linwood Dave Minter, APress Publication
7. Spring Framework Cookbook, Java Code Geeks.
8. Introducing Spring Framework, Felipe Gutierrez, APress Publication
9. Spring MVC: A Tutorial, Second Edition, Paul Deck, Brainy Software.
10. Spring MVC Beginner's Guide, Second Edition, Amuthan Ganeshan, Packt Publishing Ltd

Name of Course	Bachelor of Information Technology
Semester	Fourth
Name of Subject	Software Testing
Subject Code	BSc IT- 403

Marks Credit Points	75 Marks
Credit Points	4 Points
Lectures	50 Lectures

1. **Course Objectives:**
   - To learn detection of bugs and performance issues in software.
   - Understanding to develop and run test plans.
   - Learn testing tools to detecting quickly bugs and error to smarter testing.
   - To work with various software testing methods.
2. **Course Outcomes:**
   - Determines the correctness, completeness and quality of software being developed.
   - Technical documentation is well organized using testing.

Unit	NOS	Hours
Unit-I Quality concepts • Quality • Software Quality • McCall‟s Quality Factors • ISO 9126 Quality Factors • Targeted Quality Factors • The Cost of Quality • Quality and Security • Quality Control • Quality Assurance		**8**
Unit-II Software Quality Assurance • Software Quality Assurance • Software Reviews • Formal Technical Reviews • Software Reliability • The SQA Plan		**8**
Unit-III Software Testing Strategies • A Strategic Approach to Software Testing • Unit Testing • Integration Testing • Validation Testing • System Testing • The Art Of Debugging		**8**
Unit-IV TESTING APPLICATION • Software Testing Fundamentals • Internal and External Views of Testing • White-Box Testing • Basic Path Testing • Control Structural Testing • Black Box Testing		**12**

Unit-V Webapps For Testing • Testing Concepts for WebApps • The Testing Process-An Overview • Content Testing • User interface Testing • Navigation Testing • Security Testing		**10**
Unit-VI Product Metrics • A frame work for product metrics • Metrics for the requirements model • Metrics for design model • Metrics for source code • Metrics for testing		**5**

References:

1. Software Engineering -A Practitioner's approach, Sixth Edition, Roger S. Pressman, McGraw-Hill Higher Education; (1 August 2007),ISBN-10: 0077227808

2. Software Engineering -A Practitioner's approach, Fifth Edition, Roger S. Pressman, McGraw-Hill Higher Education; (1 August 2005)

3. Software Testing Concepts and Tools NageswaraRoo Dreamtech Publication

Name of Course	**Bachelor of Science (Information Technology)**
Semester	**IV**
Name of Subject	**Cloud Computing**
Subject Code	**B. Sc IT-404A (Elective)**
Lectures	**50 Lectures**

Course Objectives:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they are able to start usingand adopting Cloud Computing services and tools in their real life scenarios.
- To enable students exploring some important cloud computing driven commercial systems andapplications.
- To expose the students to frontier areas of Cloud Computing and information systems, whileproviding sufficient foundations to enable further study and research.

Course Outcomes:

- After successful completion of this course, student will be able to
- Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came,the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in datacenters
- Identify resource management fundamentals and outline their role in managing infrastructure incloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit I		
5.	**Enterprise computing: a retrospective**	**07 Lectures**
	5.1 Introduction 5.2 Mainframe architecture 5.3 Client-server architecture 5.4 3-tier architectures with TP monitors	

Unit II		
6.	**Internet as a platform and Software as a service**	**10 Lectures**
	6.1 Internet technology and web-enabled applications 6.2 Web application servers 6.3 Internet of services 6.4 Emergence of software as a service 6.5 Successful SaaS architectures 6.6 Dev 2.0 platforms 6.7 Cloud computing 6.8 Dev 2.0 in the Cloud for Enterprises	

Unit III		
7.	**Cloud computing platforms**	**08Lectures**
	7.1 Infrastructure as a service: Amazon EC2 7.2 Platform as a service: Google App Engine 7.3 Microsoft Azure	

Unit IV		
8.	**Web services, AJAX and mashups** 8.1 Web services: SOAP and REST 8.2 SOAP versus REST 8.3 AJAX: asynchronous 'rich' interfaces 8.4 Mashups: user interface services	**07 Lectures**

Unit V		
9.	**Web services, AJAX and mashups** 9.1 Relational databases 9.2 Cloud file systems: GFS and HDFS 9.3 BigTable, HBase and Dynamo 9.4 Cloud data stores: Datastore and SimpleDB	**08Lectures**

Unit VI		
10.	**Dev 2.0 Platforms** 10.1 Salesforce.com's Force.Com Platform 10.2 TCS InstantApps on Amzon Cloud 10.3 More Dev 2.0 platforms & related efforts 10.4 Advantages , applicability and limits of Dev 2.0	**10 Lectures**

Reference Books:

1. Enterprise Cloud Computing: Technology, Architecture, Application By Gautam Shroff at Cambridge University

Name of Course	Bachelor of Information Technology
Semester	Fourth
Name of Subject	Linux Fundamental **(Elective)**
Subject Code	BSc IT- **404B**
Marks Credit Points	75 Marks
Credit Points	4 Points

Lectures	50 Lectures

Course Objectives:

- This course shall build a platform for students to start their own enterprise
- For Making Student Job Ready
- To become familiar with open source software and user interface.
- To securely handle OS without any viruses and malwares.
- For easily use free software available on internet.
- To understand the basic operating system command.
- To understand the basic concept of Linux operating system

Course Outcomes:

- Awareness of existing demanding trends in IT industry in order to get placement & Research in open source market.
- Understand the Linux OS architecture.
- Install and use different types of distributions available in market.
- Understand the different Linux basic commands

Unit I – Introduction

What is Linux, Advantages of Linux, Disadvantages of Linux, Distributions of Linux Functions of Operating system , History and development of Linux, Features of Linux, Installation steps of Linux, Difference between Linux and Windows, Difference between Linux and Unix

Unit II – Linux Environment

Linux standard directories, Hardware requirement for Linux, Basic Commands, Commands for files and directories, File processing commands, Mathematical Commands, Login & Logout, Virtual consoles, Viewing and changing user information.

Unit III - Managing Editors and Shell

Working with Text Editors, Vi editor, features of vi, Working with emacs, Managing user accounts, Managing groups, Using the Shell, Working with permissions.

Unit IV- Linux boot process and System Services

Linux boot process, Boot Loaders (LILO and GRUB), System Initialization, inittab, System services, controlling services with – Text-Based Tool and GUI-Based Tool, top command, ps and kill commands.

Unit-V – Backup and Recovery

Background – Why data loss occurs, Choosing a backup strategy, backup hardware and media, backup and recovery software – tar, cpio, dd, alternative backup software.

Unit-VI – Printing with Linux

Overview of Linux printing, Managing print services, Creating and configuring local printers, Creating and configuring network printers, Using basic printing commands, Introduction to Common Unix Printing System(CUPS).

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Reference Books:-

1) LINUX complete reference by Richard Peterson
2) Red Hat Linux 718 by Bill Ball, David Pitts
3) Unix concept and applications by Sumitabha Das
4) Fedora 7 Unleashed by Andrew Hudson and Paul Hudson (SAMS publication)

Name of Course	Bachelor of Information Technology
Semester	Fourth
Name of Subject	Content Management System
Subject Code	BSc IT- **405 B (Open Elecive)**
Marks Credit Points	75 Marks
Credit Points	4 Points

Lectures	50 Lectures

Learning Objectives:

i. Provide the skills to effectively create and operate WordPress sites.

Course Outcomes:

After successful completion of this course, students should be able to:

i. Plan website by choosing colour schemes, fonts, layouts, and more.

ii. Select, install, and activate a theme in word press.

iii. Design e-commerce site using woo commerce plugin.

Unit I: Website Development using WordPress	NOS	Hours
Installing WordPress, Installing Themes, Creating a Child Theme, Modifying a Theme, Setting Up a WordPress Site, Starting the MRP Theme, The WordPress Loop, Continuing with the Loop,	SSC/ N0503	8
Unit II Customizing Page and Form	NOS	Hours
Splitting the Page into Templates, Creating a Page for Single Posts, Creating Pages, Customizing the Navigation Menu, Customizing the Sidebar, Creating a Custom Page Template, Adding a Contact Form, Uploading a WordPress Site	SSC/ N0503	12
Unit III: Installing plugins	NOS	Hours
What are plugins? Finding plugins, Installing plugins, Activating and deactivating plugins, Editing plugin settings, Deleting plugins,	SSC/ N0501	10
Unit IV: Adding, editing, and deleting users	NOS	Hours
Adding, editing, and deleting users, User roles and permissions, Importing content from another site, Exporting your WordPress data, WordPress General settings.	SSC/ N0501	10
Unit V: Advanced WordPress Concepts	NOS	Hours
Changing the site title and tagline, Changing your URL, Using a different homepage, Updating the admin email address, Changing time zones Date/Time formats	SSC/ N0501	10
Unit VI: Woo Commerce Plugin	NOS	Hours

Introduction to Woo Commerce, Woo Commerce installation, Convert HTML to Woo commerce using [short-code], Recent Products, Featured Products, Variable Products, Woo commerce Settings, Payment Gateway Integration, Moving woo commerce site from Local Server to Live Server	SSC/ N0501	10

References:

Reference Books:

1. Professional WordPress: Design and Development by Brad Williams, David Damstra, Hal Stern
2. WordPress To Go by Sarah McHarry.
3. WooCommerce Explained by Stephen Burge

Name of Course	Bachelor of Information Technology
Semester	Fourth
Name of Subject	**Lab 1: PHP and MySQL**
Subject Code	BSc IT- **406**
Marks Credit Points	75 Marks

Credit Points	2 Points

1. Creating HTML FORM (Registration)
2. Write PHP Code to demonstrate variable in php
3. Write php code to Handling an HTML Form
4. Write php code to study of Operators used in PHP.
5. Write php code to Validating Form Data.
6. Write php code to demonstrate Array php
7. Write php code to demonstrate String Manipulation
8. Write php code to include() and required() function
9. Write php code to demonstrate concept of Forms with PHP Redux
10. Write php code to demonstrate creating Sticky Forms
11. Write php code to demo state Creating and Calling Your Own Functions
12. Write php code to demonstrate Connecting to MySQL and Selecting the Database
13. Write php code to demonstrate Retrieving Query Results
14. Write php code to demonstrate Updating Records with PHP
15. Write php code to demonstrate Cookies
16. Write php code to demonstrate Session

Name of Course	Bachelor of Information Technology
Semester	Fourth
Name of Subject	**Lab 2:** Hibernate and Spring Framework
Subject Code	BSc IT- **407**
Marks Credit Points	75 Marks

Credit Points	2 Points

Learning Objectives:

i. To Access databases with JDBC and Hibernate.
ii. To Acquire knowledge on creation of software components using Spring Framework.
iii. To Learn safe and maintainable techniques for programming with AOP.
iv. To Understand REST, and use Spring MVC to build RESTful services.
v. To learn the creation of pure Dynamic Web Application using Spring MVC.
vi. To understand how to build complex UIs using Spring Boot.
vii. To be familiar with using Spring Boot starters and start.spring.io to easily create new applications.

Course Outcomes:

After successful completion of this course, students should be able to:

i. Implement the web based applications using JDBC and Hibernate.
ii. Implement web based applications using features of Spring Framework.
iii. Apply the concepts of server side technologies for dynamic web applications using Spring MVC.
iv. Use the core principles of Spring, and of Dependency Injection (DI) / Inversion of Control.
v. Integrate Spring MVC with technologies such as Hibernate.
vi. Learn how to build a simple MVC application using Spring Boot
vii. Configure database connectivity via Spring Boot

Lab Work/ Practical List

Programs for the demonstration of all the concepts in Hibernate and Spring Framework.

1. Write a program to implement inversion of control.
2. Write a program to demonstrate dependency injection.
3. Write a program for the demonstration of auto wiring.
4. Write a program to demonstrate Spring Tag Libraries.
5. Write a program to demonstrate View Resolver.
6. Develop Custom CRUD Application using Spring MVC and JDBC.
7. Develop Login Application using Spring MVC and Hibernate.
8. Write a program for CURD operations using Spring MVC and Hibernate.
9. Develop Spring MVC Application for following operations.
   -Customer Login
   -Add Customer

-Edit Customer Information
-Delete Customer
-View Customer List

10. Write a program that demonstrate simple spring boot application.
11. Write a program for demonstration of auto configuration in spring boot.
12. Write a program for developing web application using spring boot.
13. Write a program for demonstration of Spring Data JPA.

References:

1. Beginning Hibernate: For Hibernate 5, Fourth Edition, Joseph B. Ottinger Jeff Linwood Dave Minter, APress Publication
2. Spring Framework Cookbook, Java Code Geeks.
3. Introducing Spring Framework, Felipe Gutierrez, APress Publication
4. Spring MVC: A Tutorial, Second Edition, Paul Deck, Brainy Software.
5. Spring MVC Beginner's Guide, Second Edition, Amuthan Ganeshan, Packt Publishing Ltd

Name of Course	**B.Sc IT Third Year**
Semester	**V Semester**
Name of Subject	**Python Programming**
Subject Code	**B.SC IT-501**
Marks	**75**

Lectures	50

Couse Objectives:

- To develop background knowledge as well as core expertise in Python
- To understand the console based application and provide the knowledge creating web based applications.
- To learn the object oriented concepts.

Course Outcomes:

- To impart the knowledge on basics concepts of object oriented programming.
- To outline the various characteristics of Python.
- To provide the familiarity in the concept of developing web based & game application.
- To converse an idea of creating application using Database Handling.
- To convey the idea of Python Machine learning concept.

UNIT-I
Introduction

1.1 Introduction to Python
1.2 Features of python
1.3 Python Interpreter
1.4 Python installation

UNIT-II
Data types and control structures

2.1 Operators (unary, arithmetic, etc.)
2.2 Data types, variables, expressions, and statements
2.3 Assignment statements
2.4 Strings and string operations
2.5 Control Structures: loops and decision

UNIT-III:
Modularization and Classes

3.1 Standard modules
3.2 Packages 1
3.3 Defining Classes
3.4 Defining functions
3.5 Functions and arguments (signature)

UNIT-IV:
Exceptions and data structures

4.1 Data Structures (array, List, Dictionary)
4.2 Exception Raising
4.3 Exception Handling
4.4 Error processing

UNIT-V:

Object Oriented Design

5.1 Programming types
5.2 Object Oriented Programming
5.3 Inheritance
5.4 Polymorphism

UNIT-VI:
Database Connectivity and Networking

6.1 Getting MySQL for python
6.2 Connecting with database
6.3 Passing Query to MySQL
6.4 Networking

References:

Sr. No Name of Book Writer Publication
1. Starting Out with Python plus, MyProgramming Lab, Tony Gaddis Pearson eText --Acces s Card Package 3rd edition
2. Learning Python, Mark Lutz, O"Reilly 5th edition
3. MySQL for Python, Albert Lukaszcwskc, Packet publication 1st Edition

Name of Course	**B.Sc IT Third Year**
Semester	**V Semester**
Name of Subject	**Data Analysis with Power BI**
Subject Code	**B.SC IT-502**
Marks	**75**
Lectures	**50**

Course Objectives:

- To learn the concept of Data Analysis with Power BI.
- To understand the concepts of BI Desktop, Data from Analysis Services and Data Model
- To understand the applications of Power BI.

Course Outcomes:

- Learn the distinction between data managing Vs Data Analysis.
- Learn different Data Analysis techniques.

UNIT I:
Introducing Power BI

Why Use Power BI?, The xVelocity In-Memory Analytics Engine, Setting Up the Power BI Environment, Exploring the Power BI Desktop Interface, Importing Data into Power BI Desktop, Importing Data from Relational Databases, Importing Data from Text Files, Importing Data from a Data Feed, Importing Data from Analysis Services

UNIT II:
Data Munging with Power Query

Discovering and Importing Data, Transforming, Cleansing, and Filtering Data, Merging Data Appending Data, Splitting Data, Unpivoting Data, Inserting Calculated Columns,

UNIT III:
Data Model

Creating the Data Model, What Is a Data Model?, Creating Table Relations, Creating a Star Schema, Understanding When to Denormalize the Data, Making a User-Friendly Model

UNIT IV:
Creating Calculations with DAX

What Is DAX?, Implementing DAX Operators, Working with Text Functions , Using DAX Date and Time Functions, Using Informational and Logical Functions, Getting Data from Related Tables, Using Math, Trig, and Statistical Functions, Tips for Creating Calculations in Power BI, Creating Measures with DAX, Measures vs. Attributes, Creating Common Aggregates, Mastering Data Context, Altering the Query Context, Using Filter Functions, Using Variables in DAX

UNIT V:
Incorporating Time Intelligence

Date-Based Analysis, Creating a Date Table Time Period–Based Evaluations, Shifting the Date Context, Using Single Date Functions, Creating Semi-additive Measures

UNIT VI:
Creating Reports with Power BI Desktop

Creating Tables and Matrices, Constructing Bar, Column, and Pie Charts, Building Line and Scatter Charts, Creating Map-Based Visualizations, Linking Visualizations in Power BI, Drilling Through Visualizations, Publishing Reports and Creating Dashboards in the Power, BI Portal, Publishing Power BI Desktop Files to the Power BI Service, Adding Tiles to a Dashboard, Sharing Dashboards, Refreshing Data in Published

Reports

Reference:

1. Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence by Brett Powell, Packt Publishing Ltd

Name of Course	**B.Sc IT Third Year**
Semester	**V Semester**
Name of Subject	**Programming in C#**
Subject Code	**B.SC IT-503**
Marks	**75**
Lectures	**50**

Course Objectives:

- To learn the concept of .NET architecture.
- To understand the concepts of The Common Language Runtime(CLR) & Visual Studio
- To understand the applications of C#.

Course Outcomes:

- Learn the distinction between programming language Vs .NET.
- Learn different programming representation techniques.

UNIT I:
Introducing C#

What is c#, Why C# & Evolution of C#, Character tics of C#, How C# differs from C++ & Java, Introduction to .Net Technology & Framework, Exploring Some Key Benefits of the .NET Platform, Understanding the .NET Support Lifecycle, The Common Language Runtime(CLR), Overview of .NET Assemblies, Installing .NET 6, Visual Studio .Net & .Net languages, Integrated Development environment, Building .NET Core Applications with Visual Studio

UNIT II:
Languages Basics

Breaking Down a Simple C# Program, Using the System.Console Class, Working with System, Data Types and Corresponding C# Keywords, Data Types, Operators, Control Statements, Looping Statements, Arrays, Jagged Arrays, Array List class, String class, and String Manupulations, Understanding Method Parameters, Understanding the enum Type, Understanding Value Types and Reference Types, Boxing & Unboxing variable, Understanding C# Nullable Types, Understanding the Structure

UNIT II:
Custom Classes and OOPS

Creating Custom Classes and Objects, Understanding Constructors, Understanding the static Keyword, Understanding C# Access Modifiers, Understanding Partial Classes, Polymorphism, Abstraction class, Interfaces- Creating & using interface, Inheritances, Properties, Indexers, Delegates & Multicast Delegates, Events

UNIT III:
Lambda Expressions, Namespace, Exception handling

Understanding Lambda Expressions, Processing Arguments Within Multiple Statements, Lambda Expressions with Multiple (or Zero) Parameters, Using static with Lambda Expressions, Discards with Lambda Expressions, Creating & using Namespace (DLL library), Exception

UNIT IV:
Multithreading

Understanding System. Threading Namespace, Creating & starting Thread, Threading synchronization & Pooling

UNIT V:

Windows Application

Event Driven Programming Model, Important classes used in windows application, TextBox & Label Control, Button, CheckBox, RadioButton & GroupBox Control, ListBox & ComboBox control, Month Calendar Control, Docking Control, Tree View Control, Menu & Toolbar control, Dialog Boxes

UNIT VI:
Database Connectivity, XML & Entity Framework Core

Advantages of ADO.NET, Managed Data providers, developing a Simple ADO.NET Based Application, Retrieving & Updating Data From Tables, XML, Introducing Entity Framework Core, Object-Relational Mappers, Understanding the Role of the Entity Framework Core, The Building Blocks of the Entity Framework, The DbContext Class, The DbSet<T> Class, The ChangeTracker, Entities, Owned Entity Types, Query Types, Query Execution, Mixed Client-Server Evaluation, Tracking vs. NoTracking Queries, Code First vs. Database First, The EF Core Global Tool CLI Commands, The Migrations Commands, The Database Commands, The DbContext Commands, Creating Records, Querying Data

References:

1. Programming in C#, E Balagurusamy, Mc Graw Hill
2. Visual C#.Net, C Muthu, Mc Graw Hill

Name of Course	**B.Sc IT Third Year**
Semester	**V Semester**
Name of Subject	**Introduction to AI and ML**
Subject Code	**B.Sc IT – 504 A**
Marks	**75**
Lectures	**50**

Learning Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

- Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
- Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
- Learn different knowledge representation techniques.

UNIT – I

Introduction to AI

Definitions – Foundation and History of AI, Evolution of AI - Applications of AI, Classification of AI systems with respect to environment. Artificial Intelligence vs Machine learning, Relationship between attributes: Covariance, Correlation Coefficient, Chi Square. Intelligent Agent: Concept of Rationality, nature of environment, structure of agents.

UNIT - II

Problem Solving

Heuristic Search Techniques: Generate-and-Test; Hill Climbing; Properties of A* algorithm, Bestfirst Search; Problem Reduction. Constraint Satisfaction problem: Interference in CSPs; Back tracking search for CSPs; Local Search for CSPs; structure of CSP Problem. Beyond Classical
Search: Local search algorithms and optimization problem, local search in continuous spaces,
searching with nondeterministic action and partial observation, online search agent and unknown environments.

UNIT - III

Knowledge and Reasoning

Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order Logic, situation calculus. Theorem Proving in First Order Logic, Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks. Probabilistic reasoning over time: time and uncertainty, hidden Markova models, Kalman filter, dynamic bayesian network, keeping track of many objects.

UNIT - IV

Introduction to Machine Learning

Introduction to Machine Learning, Examples of Machine Learning Applications, Learning Types Supervised Learning -Learning a Class from Examples, Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm Dimensionality Reduction- Introduction,Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis, Isomap, Locally Linear Embedding

UNIT – V
Linear Methods for Regression

Introduction, Linear Regression Models and Least Squares, Subset Selection, Shrinkage Methods-Ridge Regression, Lasso Regression, Least Angle Regression, Methods Using Derived Input Directions-Principal Components Regression, Partial Least Squares, A Comparison of the Selection and Shrinkage Methods , Multiple Outcome Shrinkage and Selection, More on the Lasso and Related Path Algorithms, Logistic Regression-Fitting Logistic Regression Models, Quadratic Approximations and Inference, L1 Regularized Logistic Regression

UNIT – VI
Support Vector Machines and Tree-Based Models

SVM-Introduction to SVM, The Support Vector Classifier, Support Vector Machines and Kernels- Computing the SVM for Classification, The SVM as a Penalization Method, Function Estimation and Reproducing Kernels, SVMs and the Curse of Dimensionality, A Path Algorithm for the SVM Classifier, Support Vector Machines for Regression, Regression and Kernels. Tree Based Methods-Regression Trees, Classification Trees, Random Forests- Definition of Random Forests, Details of Random Forests- Out of Bag Samples, Variable Importance, Proximity Plots, Random Forests and Overfitting, Analysis of Random Forests-Variance and the De-Correlation Effect, Bias, Adaptive Nearest Neighbors.

References:

1) Russell, S. and Norvig, P. 2015. Artificial Intelligence - A Modern Approach, 3rd edition, Prentice Hall
2) J. Gabriel, Artificial Intelligence: Artificial Intelligence for Humans (Artificial Intelligence, Machine Learning), Create Space Independent Publishing Platform, First edition , 2016
3) Introduction to Machine Learning Edition 2, by Ethem Alpaydin
4) The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009.
5) Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.

.Name of Course	**B.Sc IT Third Year**
Semester	**V Semester**
Name of Subject	**ReactJS**
Subject Code	**B.Sc IT – 504 B**
Marks	**75**
Lectures	**50**

Learning Objectives:

1. React JS course would enable the students in understanding Basics of front end
2. Design & write the simple web development using React JS programming.
3. Learn how to design forms, web applications.
4. Learn fundamental concepts of React JS such as. State, Props, Operators, conditional and looping statements, Arrays, Arrow functions etc.

Course Outcomes:

After successful completion of this course, students should be able to:

1. To design front end applications.
2. To write web application to solve the given problem
3. To design program using java script.

Unit I:
Introduction to JavaScript Hours

Variables, Arrow functions, Rest and spread, Object and array, destructuring, Template, literals, Classes, Callbacks, Promises, Async/Await ES Modules

Unit II:
Basics of React Concepts Hours

what is react?, benefits of using react, first react code, creating component classes, working with properties, what is JSX, benefits, understanding JSX, React and JSX gotchas, React component states, working with states, states and properties, stateless components, Hooks

Unit III:
Styling and Hooks

CSS in React, Inline Styling, SAAS, What is HOOK?, useState, useEffect, useContext, useRef, useReducer, useCallback, useMemo, Custom Hooks

Unit IV:
Working with forms and Menus Hours

Defining a form and its events, form elements, form validations, Bulding menu with JSX, Bulding menu without JSX.

Unit V:
React Architecture Hours

Adding webpack to project, React router, router features, React Memo 10

Unit VI:
Redux Hours

flux data architecture, redux data library, GraphQL 10

References:

1. React Quickly- AZAT MARDAN, ISBN 9781617293344, ©2017 by Manning Publications, Edition First.
2. Learning React Functional Web Development with React and Redux, Alex Banks and Eve Porcello First Edition, O'Reilly.

Name of Course	B. Sc IT Third Year
Semester	V Semester
Name of Subject	Cyber Security
Subject Code	B. Sc IT – 505 B
Marks	75
Lectures	50

Objectives:

1. Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an Organization.
2. Practice with an expertise in academics to design and implement security solutions.
3. Understand key terms and concepts in Cryptography, Governance and Compliance.
4. Develop cyber security strategies and policies
5. Understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.

Outcomes:

1. Analyze and evaluate the cyber security needs of an organization.
2. Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.

Unit - I

IT Act and Encryption

1.1 Object of the Act
1.2 Scope of the Act
1.3 Symmetric Cryptography
1.4 Asymmetric Cryptography
1.5 RSA Algorithm
1.6 Public Key Encryption

Unit - II

Authentication of Electronic records & E-Governance

2.1 Authentication of Electronic records
2.2 Digital Signature
2.3 RSA Digital Signature
2.4 Hash Function
2.5 Working of Digital Signature
2.6 Electronic Governance

Unit - III

Certifying Authorities

3.1 Need of Certifying Authorities
3.2 Functioning of Certifying Authorities
3.3 Types of Certificates
3.4 Identification, Authorizing, Transactional certificate
3.5 Appointment of Controller

3.6 Functions of Controller

Unit - IV

Domain name Disputes

4.1 Background of Domain Names
4.2 Where lies the dispute?
4.3 Insertion of Internet Domain Names and the trademark Law
4.4 Classification of Cyber Crime, Target of computer crime

Unit-V

Cyber Crimes and Computer Virus

5.1 Damage to computer System: Unauthorized Access, Packet Sniffing. Tempest attack, Password Cracking, Butter overflow
5.2 Computer virus: Viruses, Logic Bomb, Worms, Trojan Horse Programme, Denial of Service, Tampering with Computer Source Documents.

Unit-VI

Digital Devices Security , Tools and Technologies for Cyber Security

6.1 End Point device and Mobile phone security, Password policy, Security patch management, Data backup,
6.2 Downloading and management of third party software, Device security policy, Cyber Security best practices,
6.3 Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security,
6.4 Configuration of basic security policy and permissions.

References:

Cyber Law in India by Farooq Ahmad – Pioneer Books

Hand book of Cyber & E-commerce Laws by P.M. Bakshi & R.K.Suri – Bharat Law house New Delhi

The Indian Cyber Law by Suresh T Vishwanathan – Bharat Law house New Delhi.

Guide to Cyber Laws by Rodney D. Ryder –Wadhwa and Company Nagpur

B.SC IT-506 Python Programming
15- Practical's Based on Syllabus

B.SC IT-507 Data Analysis with Power BI
15- Practical's Based on Syllabus

Name of Course	B. Sc IT Third Year
Semester	VI Semester
Name of Subject	Python for Data Science
Subject Code	B.SC IT – 601
Marks	75
Lectures	50

Course Objectives:

1. To learn data collection and preprocessing techniques for data science
2. To Understand and practice analytical methods for solving real life problems.
3. To study data exploration techniques
4. To learn different types of data and its visualization
5. To study different data visualization techniques and tool

Course Outcomes:

1. Apply data preprocessing methods on open access data and generate quality data for analysis Apply and analyze classification and regression data analytical methods for real life problems. Implement analytical methods using Python
2. Apply different data visualization techniques to understand the data.
3. Analyze the data using suitable method; visualize using the open source tool.
4. Model multidimensional data and visualize it using appropriate tool

UNIT I:
Introduction to Data Science

Defining data science, Data Science Jobs, Recognizing the different types of data, Gaining insight into the data science process, Data Science Process: Overview, Different steps. Data Preparation, Model Planning, Model Building, Communicating Results, Operationalization
Basic terminologies of Data Science
a. Data science b. Data scientist c. Data set d. Data mining e. Data visualization f. Data modeling g. Data wrangling h. Big data i. Machine learning j. Algorithms k. Deep learning

UNIT II:
Basics of Data Visualization

Introduction to data visualization, challenges of data visualization, Definition of Dashboard, Their type, Evolution of dashboard, dashboard design and principles, display media for dashboard. Types of Data visualization: Basic charts scatter plots, Histogram, advanced visualization Techniques like streamline and statistical measures, Plots, Graphs, Networks, Hierarchies, Reports. Data Science with MS-Excel, Data Science with Google Data Studio.

UNIT III:
Modules and Exception Handling in Python

Importing a Module
Importing an Entire Module
Importing a Module Under an Alias
Importing Specific Module Entities

Reloading a Module
Module Search Path
Module Loading and Compilation
Tricks for Importing Modules
Using import in a Script
Trapping import Statements
Identifying a Module or a Script
Packages
Creating a Module
Standard Modules, Packages, Exception raising, Exception Handling, Error Processing.

UNIT IV:
Working with Files

File Processing
Reading
Writing to a File
Changing Position
Controlling File I / O
File Locking
Getting File Lists
Basic File / Directory Management
Access and Ownership
Checking Access
Getting File Information
Setting File Permissions
Manipulating File Paths

UNIT V:
Pandas Data Analysis library [Data Processing]

Why Pandas? Features of Pandas, Data structures in Pandas a. Series b. DataFrame c. Panel d. Panel4D Series creation a. Using ndarray b. Using dict c. Using scalar values d. Using list, Accessing elements of Series a. Using indexing b. Using slicing c. Using ranging d. Using iloc method e. Using loc method Vectorising operations a. Vector operations using same index values b. Vector operations using different index values, DataFrame creation a. Using list b. Using dict c. Using ndarray d. Using series e. Using DataFrame ϖ Viewing DataFrame elements a. Using describe function b. Using column name c. Using iloc method d. Using iat method e. Using head() f. Using tail() g. Using index method

UNIT VI:
Numpy, Matplotlib

Handling missing values, Statistical functions in data operations, SQL operations in pandas,
Numpy – Mathematical Computation Why numpy? Powerful properties of numpy ϖ Types of arrays, Attributes of ndarray , Basic operations, Creating functions for array, Copy and view, Shape manipulation, Matplotlib library, Chart properties, Styling the char, Types of presentation styles, Why and How Data to be distributed?, Types of distribution, Advanced Data Visualization using SEABORN

Reference Books: -

1. Learning Python-Mark Lutz-O"Reilly 5th edition
2. Data Mining: Concepts and Techniques Jiawei Han, MichelineKamber, Jian Pei Data Science from Scratch Joel Grus O'Reilly Media Inc
3. MySQL for Python-Albert Lukaszcwskc-Packet publication 1st edition
4. Django 2 by Example (Build powerful and reliable Python web applications from scratch)-Antonio Mele

Name of Course	B. Sc IT Third Year
Semester	**VI Semester**
Name of Subject	**ASP .Net Core**
Subject Code	**B.SC IT – 602**
Marks	**75**
Lectures	**50**

Course Objectives:

1. Understand the benefits of MVC design over traditional ASP.NET Web Forms.
2. Acquiring sufficient knowledge on role of Model, View and Controller in integrating them to developcomplete web application
3. Understand how Routing API maps requests to action methods in controller.
4. Learn how to reuse code rendering HTML using custom HTML Helper methods and Tag Helpers.
5. Building Custom Model Binders for typical conditions in which built-in default binders are not usable.

Course Outcomes:

1. Understanding and applying validation framework for both client and server validations.
2. Access databases and performing CRUD operations using LINQ and Entity Framework
3. Implement security in ASP.Net Core applications.
4. Develop Service Oriented RESTful services using Web API feature of ASP.NET Core.
5. Build and deploy ASP.NET Core application to the production server.

UNIT I:
Introduction to ASP.NET Core

Introduction
What is ASP.NET Core?
ASP.NET Core Features
Advantages of ASP.NET Core
MVC Pattern
Understanding ASP.NET Core MVC
ASP.NET Core vs. ASP.NET MVC vs. ASP.NET Web Forms
ASP.NET Core Environment Setup
ASP .NET Core First Application
Project Layout
Understanding Life Cycle of ASP.Net Core Request

UNIT II:
Controllers Action Methods and View

Controllers Overview
Action Methods and IActionResult object
Passing data from Controller to View
Understanding Action Selectors
Action Filters
Building Custom Action Filters
Middleware
Asynchronous Action Methods
Introducing Razor View
Advantages of Razor View
Razor Syntax
Types of Views
Partial Views
Layout Pages
Special Views
View Categorization based on Model

UNIT III:

Helpers and Model Binding

Html Helpers
Built-In Html Helpers
URL helpers
Tag Helpers
Custom Tag Helpers
Html Form behavior
Model Binder Overview
DefaultModelBinder
Binding to Complex Classes
IFormCollection Model Binding
IFormFile Model Binder
Bind Attribute
TryUpdateModelAsync

UNIT IV:
Validations & Data Annotations, State management Techniques

Data Annotations and Validations Overview
Validations with Data Annotation
Server Side and Client Side Validation
Custom Server side validation
Model level validation using IValidatableObject
Custom unobstrive Client side Validation
Remote Validation
Cookies
Sessions

UNIT V:

Security, MVC and Entity Framework Core, Web Caching

Authentication and Authorization
Implementing Security using ASP.NET Core Identity
Basic CRUD Operations using Entity Framework
Separation of work using BO Classes
Writing Generic Class / Repository
Caching in Repository
Cache Tag Helpers
Memory Caching Introduction
In-Memory Caching
Response Cache
Distributed Cache

UNT VI:

Routing, Module Development, Web API and JQuery Ajax

Url Routing Overview
Custom Routes
Attribute Routing
Routing Constraints
Understanding Areas
Adding Areas
Defining Area Routes
Linking between Areas
Introduction to Web API
AJAX implementation using JQuery
Calling the Web API with JQuery Ajax
Creating a Web API that Supports CRUD Operations using EF

References

1. PROGRAMMING ASP.NET CORE Paperback – 1 January 2019 by Dino Esposito (Author)
2. ASP.NET Core in Action, Second Edition , Andrew Lock, March 2021

.Name of Course	**B.Sc IT Third Year**
Semester	**VI Semester**
Name of Subject	**Computer Vision**
Subject Code	**B.SC IT – 604 A**
Marks	**75**
Lectures	**50**

Course Objectives:

1. The purpose of this course is to gain a basic understanding of computer vision and image analysis for 2D computer vision. The course will focus on problem solving based on this technology and industrial applications.

Course Outcomes:

Students who successfully complete this course will be able to:

1. Processing and analysis of gray level images to understand the scene
2. Perform binary image processing for simple problem solving.
3. Getting to know color and color images and using them to solve visual problems

Unit I:

Introduction

Computer Vision Definition and Image Processing and Their Differences - History and Applications of Computer Vision

Unit II:

Basic Principles of Digital Imaging

Elements of Visual Understanding - Light and Electromagnetic Spectrum - Image Sense and Imaging - Sampling and Multiplication - Relationships between Image Points - Linear and Nonlinear Operations - Principles and Color Models - Quasi-colored images

Unit III:

Image Editing

Gray Level Conversions - Histogram Correction - Location Filter - Smoothing and Sharpening

Unit IV:

Morphological operations

Binary mathematical morphology - operators of corrosion, expansion, opening, and closing - Basic morphological algorithms

Unit V:

Image Segmentation

Segmentation Based on Edge Detection, Thresholding, and Area Growth – Determination

Unit VI:

Object Identification

Decision-Making Methods such as Statistical Classification, Neural Networking

Reference Books :

[1] A. Kaehler and G. Bradski, “Learning OpenCV 3”.

[2] J. Minichino and J. Howse “Learning OpenCV 3 with Python”.

[3] R. Szeliski, “Computer vision: algorithms and applications”.

[4] R. C. Gonzalez and R. E. Woods, “Digital Image Processing (4th Edition)”.

Name of Subject	Introduction to IoT
Subject Code	B.SC IT – 604 B
Marks	75
Lectures	50

Course Objectives:

To study the fundamentals about IoT

1. To study about IoT Access technologies
2. To study the design methodology and different IoT hardware platforms.
3. To study the basics of IoT supporting services.
4. To study about various IoT case studies and industrial applications.

Course Outcomes:

After successful completion of this course, students should be able to:

1. Understand the basics of IoT.
2. Implement the state of the Architecture of an IoT.
3. Understand design methodology and hardware platforms involved in IoT.
4. Understand how to analyse and organize the data.
5. Compare IOT Applications in Industrial & real-world.

Unit I:
Basics of IoT Networking

Overview of Internet of Things
Wireless Sensor Networks
Machine-to-Machine Communications
Cyber Physical Systems

Unit II:
Introduction to Internet of Things

Evolution of IoT
Enabling IoT and the Complex Interdependence of Technologies
IoT Networking Components
Addressing Strategies in IoT

Unit III:
IoT Sensors, Actuators and Microcontroller devices

Sensors
Sensor Characteristics
Sensing Types.
Actuators
Actuator Characteristics
Actuator Types.
Arduino
Raspberry Pi

Unit IV:
Processing in IoT

Data Format
Importance of Processing in IoT
Processing Topologies
IoT Device Design and Selection Considerations

Unit V:
IoT Connectivity Technologies

IEEE 802.15.4, Zigbee, RFID, DASH7, NFC, Z-Wave
Cloud Computing
Virtualization
Cloud Models
Sensor-Cloud: Sensors-as-a-Service
Fog Computing and Its Applications

Unit VI:
Application Areas and Futures of IoT

Agricultural IoT
Components of an agricultural IoT
Advantages of IoT in agriculture
Smart irrigation management system
Vehicular IoT
Components of vehicular IoT
Advantages of vehicular IoT
Healthcare IoT
Components of healthcare IoT
Advantages and risk of healthcare IoT
Evolution of New IoT Paradigms
Challenges Associated with IoT
Emerging Pillars of IoT

References:

1. Introduction to IoT by Sudip Misra, Anandarup Mukherjee, Arijit Roy | Publication Cambridge University Press | ISBN 9781108842952, ISBN 9781108959742.
2. The Internet of things_ do-it-yourself projects with Arduino, Raspberry Pi, and BeagleBone Black | ISBN: 978-0-07-183521-3
3. he Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012.| ISBN 978-1-11999435-0

Name of Subject	MongoDB
Subject Code	B.SC IT – 605 B
Marks	75
Lectures	50

Learning Objectives:

1. MongoDB course would enable the students in understanding Basics of NoSQL Databases to design the queries.
2. Learn how to design Queries.
3. Learn fundamental concepts of Mongo DB such as secondary indexes, range queries, sorting, aggregations, and geospatial indexes etc.

Course Outcomes:

After successful completion of this course, students should be able to:

1. To covers aspects on Big Data, NOSQL and details on architecture and development on MongoDB.
2. To write Database application to solve the given problem
3. To use sorting, aggregations, geospatial indexes and server-side rendering.
4. To design program using MongoDB.

UNIT I:
Introduction to MongoDB

Ease of Use , Easy Scaling , Tons of Features

UNIT II:
Getting Started

Documents Collections
Dynamic Schemas
Naming Databases
Getting and Starting MongoDB
Introduction to the MongoDB Shell
Running the Shell
A MongoDB Client
Basic Operations with the Shell Data Types
Basic Data Types Dates
Arrays
Embedded Documents
_id and ObjectIds

UNIT III:
Creating, Updating, and Deleting Documents

Inserting and Saving Documents Batch Insert
Insert Validation Removing
Documents Remove Speed Updating
Documents Document Replacement
Using Modifiers Upserts
Updating Multiple Documents
Returning Updated Documents

UNIT IV:
Querying

Introduction to find
Specifying Which Keys to Return Limitations
Query Criteria Query Conditionals
OR Queries
$not
Conditional Semantics Type-Specific
Queries null
Regular Expressions Querying
Arrays
Querying on Embedded Documents
$where Queries Server-Side
Scripting Cursors
Limits, Skips, and Sorts Avoiding Large Skips
Advanced Query Options

UNIT V:
Indexing

Introduction to Indexing Introduction to Compound
Indexes Using Compound Indexes
How $-Operators Use Indexes Indexing Objects
and Arrays Index Cardinality
Using explain() and hint() The Query
Optimizer When Not to Index
Types of Indexes
Unique Indexes
Sparse Indexes
Index Administration
Identifying Indexes Changing Indexes

UNIT VI:

Aggregation

The Aggregation Framework Pipeline Operations

$match

$project

$group

$unwind

$sort

$limit

$skip

Using Pipelines MapReduce

Example 1: Finding All Keys in a Collection Example 2: Categorizing Web Pages MongoDB and MapReduce

Aggregation Commands count

distinct

group

References:

1. MongoDB: The Definitive Guide, Second Edition by Kristina Chodorow, Published by O'Reilly Media, Inc., isbn=9781449344689.

2. Practical MongoDB: Architecting, Developing, and Administering MongoDB Shakuntala Gupta Edward NavinSabharwal, ISBN-13 (pbk): 978-1-4842-0648-5, Published by APRESS, First Edition.

B.SC IT-606 Python for Data Science
15- Practical's Based on Syllabus

B.SC IT-607 ASP .Net Core
15- Practical's Based on Syllabus