|| सा विद्या या विमुक्तये ||

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)
Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७–२०२०**च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील **द्वितीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०—२१ पासून लागू करण्यात येत आहेत.

1. B.Sc.-II Year-Biophysics
2. B.Sc.-II Year-Bioinformatics
3. B.Sc.-II Year-Biotechnology
4. B.Sc.-II Year-Biotechnology (Vocational)
5. B.Sc.-II Year-Food Science
6. B.Sc.-II Year-Botany
7. B.Sc.-II Year-Horticulture
8. B.Sc.-II Year-Agro Chemical Fertilizers
9. B.Sc.-II Year-Analytical Chemistry
10. B.Sc.-II Year-Biochemistry
11. B.Sc.-II Year-Chemistry
12. B.Sc.-II Year-Dyes & Drugs Chemistry
13. B.Sc.-II Year-Industrial Chemistry
14. B.C.A. (Bachelor of Computer Application)-II Year
15. B.I.T. (Bachelor of Information Technology)-II Year
16. B.Sc.-II Year-Computer Science
17. B.Sc.-II Year-Network Technology
18. B.Sc.-II Year-Computer Application (Optional)
19. B.Sc.-II Year-Computer Science (Optional)
20. B.Sc.-II Year-Information Technology (Optional)
21. B.Sc.-II Year-Software Engineering
22. B.Sc.-II Year-Dairy Science
23. B.Sc.-II Year-Electronics
24. B.Sc.-II Year-Environmental Science
25. B.Sc.-II Year-Fishery Science
26. B.Sc.-II Year-Geology
27. B.Sc.-II Year-Mathematics
28. B.Sc.-II Year-Microbiology
29. B.Sc.-II year Agricultural Microbiology
30. B.Sc.-II Year-Physics
31. B.Sc.-II Year Statistics
32. B.Sc.-II Year-Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड — ४३१ ६०६.

जा.क्र.: शैक्षणिक—१/परिपत्रक/पदवी—सीबीसीएस अभ्यासक्रम/ २०२०—२१/३३३

दिनांक : १५.०७.२०२०.

स्वाक्षरित/—
उपकुलसचिव
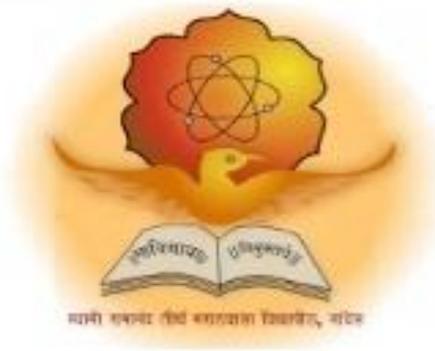शैक्षणिक (१—अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

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

Syllabus of

Second Year B.Sc. Computer Science
(Revised CBCS pattern)

Introduced from Academic Year 2020-2021

B.Sc. Computer Science

B.Sc. Computer Science (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 is of six semesters, which is normally completed in three years.

CBCS pattern

The B.Sc. Computer Science program as per CBCS (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. Computer Science** program is as per the 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 and 05 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 CBCS pattern, students would graduate **B.Sc. Computer Science** with a minimum number of required credits which includes compulsory credits from core courses, open electives 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. Computer Science** 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 **Computer Science** 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

Second Year B.Sc. Computer Science
(Revised CBCS pattern)
Introduced from Academic Year 2020-2021

Year	Semester	Course category	Course Code	Course Title	credits
Second	Third	Core Course	BCS-301	Object Oriented Programming	04
		Core Course	BCS-302	Computer Networks	04
		Core Course	BCS-303	Data Structure and Algorithms	04
		Chose any one from the below Elective courses			
		Elective Subject	BCS-304 A	Discrete Mathematics	04
			BCS-304 B	Mathematical Technique In Computer Science (MTCS)	
		Chose any one Open Elective courses			
		Open Elective	BCS-305 A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			BCS-305 B	Numerical Abilities	
		Lab / Practical	BCS-306	C++ Programming	02
			BCS-307	Data Structure and Algorithms	02
Total					**24**
Second	Fourth	Core Course	BCS-401	Programming in JAVA	04
		Core Course	BCS-402	Software Engineering	04
		Core Course	BCS-403	Relational Database Management System	04
		Chose any one from the below Elective courses			
		Elective Subject	BCS-404A	Principle of Compiler Design	04
			BCS-404B	Essentials of Computer Security	
		Chose any one Open Elective courses			
		Open Elective	BCS-405A	University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses OR	04
			BCS-405B	Logical Reasoning	
		Lab / Practical	BCS-406	RDBMS	02
			BCS-407	JAVA Programming	02
Total					**24**

Paper Title -Object Oriented Programming

BCS-301

Course objective :-

- To understand how C++ improves C with object-oriented features.

- To learn the syntax and semantics of the C++ programming language.

- Apply the concepts of object-oriented programming

- To learn how to define classes using inheritance to promote code reuse in C++.

- Illustrate the process of data file manipulations using C++

- Learn syntax, features of Standard Template Library and how to utilize it.

Course outcome :-

- Ability to explain the difference between object oriented programming and procedural programming concepts.

- Ability to program using object oriented features such as inheritance and polymorphism, , operator overloading, dynamic memory allocation, file I/O, exception handling, etc

- Ability to apply object oriented techniques to solve computing problems.

Unit – 1   **(Lecture – 6)**

Introduction to basic concepts of OOPs Object Oriented Programming Paradigm, Basic concepts of OOP's, Benefits and Applications of OOP, Structure of C++ program. A simple C++ Program.

Unit – 2   **(Lecture – 8)**

Tokens, Expressions and Control Structures Tokens, Keywords , Identifiers, and Constants , Data-types , Reference variable, Operators in C++, , Manipulators , Type Cast operator, Operator precedence , Control Structures. Function, function prototyping, call by reference, return by reference, Inline function, Default Argument, function overloading

Unit – 3   **(Lecture – 6)**

Class and object Specifying a class and object, Defining Member Functions, Nesting of member function, Memory allocation for objects, Static data member, static Member function, Friend function, Returning objects

Unit – 4   **(Lecture – 6)**

Constructors and Destructors Constructors, parameterized constructors, Constructors with default arguments, Dynamic initialization of objects, Copy Constructor, Destructors

Unit – 5   **(Lecture – 8**

Inheritance, Operator Overloading and polymorphism Defining Derived classes, Types of inheritance, Virtual base class, Abstract class, Defining Operator overloading , Overloading Unary and binary operators , Pointer to object, This pointer , Pointer to Derived classes , Virtual function , Pure virtual function

Unit – 6   **(Lecture – 8)**

Console and File I/O operations C++ stream classes , formatted and unformatted console I/O operations, C++ classes for file stream operations, for file I/O, Opening and closing file, sequential and random access, Error handling during a file operation, command line arguments, class Templates, function templates, introduction to STL.

Reference Books:-

 1) The C++ Complete Reference -TMH Publication

2) Object-Oriented Programming with C++ -E-Balgurusamy

3) Let us C++ -Yashwant kanetkar

Paper Title – Computer Network

BCS-302

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   (Lecture – 8)

- Definition & Applications of Computer Network
- Basic Concepts Signals, Types – Analog and Digital Signals
- Network topologies- star, bus, mesh, ring
- Data Transmission Media
- Network Types LAN, MAN, WAN
- Connection Oriented & Connectionless services

Unit II : Network Models &Services   (Lecture –8)

- Protocol Hierarchies
- Design issues for layers
- Connection Oriented & Connectionless services
- Service Primitives - listen, connect, receive, send, disconnect
- Network Models – OSI/ISO Reference Model & TCP/IP Model

UNIT III: - Network Architecture & Hardware   (Lecture – 6)

- Protocol stack design issues of the layers -addressing, error control, flow control, multiplexing and demultiplexing
- Routing
- Network Devices - NIC Cards, Hub, Switch, Bridges, Gateways, Repeaters Router.

UNIT IV: - Multiplexing and Switching   **(Lecture – 8)**

Concept of modulation and their application

- Multiplexing – Time division and Frequency division
- Switching - Circuit Switching ,Packet Switching ,Message Switching
- Transmission Modes-Parallel Transmission, Serial Transmission – Asynchrounous and Synchrouous

UNIT V: - . Network Standards and Network protocols   **(Lecture – 8)**

- Network Standards – Ethernet, Fast Ethernet, Gigabyte Ethernet, 10Base5, 10Base2, 10BaseT, 10Base-F
- Network Protocols- IP protocol, SMTP, PPP, FTP, HTTP, SNMP
- IP-addresses , sliding window protocols, Pipelining.

UNIT V: - 6. Internet   **(Lecture – 6)**

- Internet verses Intranet
- Internet Service Providers
- E-mail – Architecture and Services WWW-Client side and Server side
- ISDN Architecture, PBX, FDDI.

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.

Title of the Paper- Data Structure and Algorithms

Course code- BCS-303

Course objective:-

- 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 problems with the help of fundamental data structures

Course 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 1 Introduction   **(Lecture – 6)**

Introduction , Basic terminology, elementary data organization , Data structure , Data structure operation , Algorithm complexity

Unit 2 Array, Records and Pointers   **(Lecture – 8)**

Linear array ,Representation of linear array in memory , Traversing linear array , Inserting and Deleting , Searching methods (Binary and linear search), Sorting Method (selection sort, bubble sort and Insertion sort)

Unit 3 Linked List   **(Lecture –8)**

Linked list , Representation of Linked list in memory , Traversing a linked list ,Searching a linked list , Memory allocation, Garbage collection , Insertion into Linked List , Deletion from Linked List , Two way Linked List

Unit 4 Stack   **(Lecture – 8)**

Introduction, stack, Array Representation of stack, Linked Representation of stack, Push & pop operation, Arithmetic expression: Polish Notation, Infix, postfix & prefix notations ,Evaluation of postfix expression , Recursion :factorial, Fibonacci

Unit 5 Queue   **(Lecture – 6)**

Introduction, Queues, Linked Representation of Queue, Insertion & Deletion on Queue. , D-queue, Priority Queue.

Unit 6 Tree & graph   **(Lecture – 8)**

Binary Trees, Representation of Binary Tree in Memory, Types of Binary tree , Traversing of binary tree(pre-order, post-order, in-order) , Header Nodes:Threads , Graph Theory Terminology, Sequential Representation of graph , Operations on graph

Reference Books

1 Data Structure Seymour Lipschutz Mcgraw Hill

2 An Introduction to Data Structure with Application jeanpaul, tremblay paul, g. sorenson tata Mcgraw Hill

Paper Title- Discrete Mathematics

Code: BCS-304 A (Elective)

Course Objectives:

Students will develop problem-solving & critical thinking skills & use these skill to solve complex computational problems

Course Outcome:

Apply mathematical foundation to the discipline of Computer Science

Unit I – Set Theroy   **(Lecture – 6)**

Introduction, Definition & type, Equal sets, Subsets, Venn diagram, Set operation, Properties of sets

Unit II – Mathematical Logic   **(Lecture – 7)**

Propositions
Logical connectivity & compound statement, Truth values & truth table, Statement pattern & logical quivalence, Tautology, Contradiction, Contingency

Unit III- Matrices & Determinants   **(Lecture – 8)**

Definition & Types, Equality & transpose of matrices, Algebra of matrices, Definition of determinant, Ad-joint of matrices, Inverse of matrices ,

Unit IV- Co-ordinate Geometry   **(Lecture – 8)**

Introduction, Co-ordinates of a point and quadrants, Distance between two points, Equation of straight line, Slope of line, Equation of circle.

Unit V- Relation & function   **(Lecture – 8)**

Cartesian products, Relation, , Domain, Range, Type of function

Unit VI – Graph theory   **(Lecture – 8)**

Definition & types of graphs, incidences & degree of vertices, Isomorphism of graphs, Tree, Centre of tree, Binary tree

Reference Books

1. Elements of discrete mathematics, C. L. Liu
2. Discrete mathematics, Olympia Nicodemi
3. Graph theory, NarsingDeo
4. Basic mathematics, Mittal & Agrawal

Paper Title: Mathematical Technique in Computer Science (MTCS)
BCS-304 B (Elective)

Objective:

Knowledge, skill & understanding develop understanding & fluency in mathematics through inquiry, exploring & connecting mathematical concept choosing & applying problem – solving skills.

Outcomes:

- Able to use standard mathematical techniques to solve elementary problem.
- Understand the nature of mathematical proof & be able to write clear & concise proof.

Unit I- Set theory   10 Lectures

Definition & types of set ,Venn diagram ,Set operation .Properties of sets ,Numerical example

Unit II -Arithmetical ability   10 Lectures

Numbers, Asthmatic progression & Geometric progression ,Divisibility tests ,H.C.F.and L.C.M. of numbers ,Time, Work and distance.

Unit III Matrix   15 Lectures

Matric & types ,Algebra & Matrices ,Definition of determinants ,Adjoint of matrix ,Inverse of matrix

UNIT IV - Graph theory   15 Lectures

Definition & types of groups ,Degree of vertices ,Isomorphism graph ,Walks, paths & circuits Subgraph

Unit V - Probability   15 Lectures

Introduction ,Sample space,Event and type, Definition of probability , Examples on probability

Unit VI - Relation   15 Lectures

Introduction ,Relation on set ,Types of relation ,Operation on set, Properties of relatiom

Reference Books :

1) Discrete mathematics – C. L. Lui
2) Group theory- Nimkar&Solapurkar
3) A text book of Discrete mathematics Dr.swapankumar Sarkar
4) Quantitative Aptitude - Dr. R. S. Aggarwal

BCS-305 A (Open Elective)

BCS-305 B (Open Elective) Numerical Abilities

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 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 1: Introduction of Number system   (Lecture – 8)

Numbers: Types of numbers   b) Divisibility tests of numbers c) arithmetic progression d) Geometric progression   e) Relationship between Arithmetic progression and Geometric progression

 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 and HCF of fractions and decimal numbers, Applications of LCM and HCF.

UNIT II :- **Average, Problem on ages, Percentage, and Profit and Loss (Lecture – 8)**

a) Average: Definition of average, Formulae and theoretical problem on average , b) Problem on ages: simultaneous equations and their applications c) Theoretical problems on ages, Theoretical problems on numbers. ,d) Percentage: Concept of percentage, Application of percentage, Results on populations, Result on depreciations, Theoretical problem on percentage. ,e) Profit and Loss: Definition of cost price, selling price and profit, Formulae of profit and loss, Theoretical problems on profit and loss.

UNIT III :- Percentage (Lecture –6)

a) Percentage: Concept of percentage, Application of percentage, Results on populations,

b) Result on depreciations, Theoretical problem on percentage

UNIT IV :- Time and Work, Time and Distance and Problems on Train (Lecture – 8)

a) Time and Work: Concept of time and work, Relationship between time and work, Theoretical problems on time and work b) Time and Distance: Concept of time and distance, Formulae of time and distance, Theoretical problems on time and distance. c) Problems on Train: Formulae of problems on train, Theoretical problems on train.

Unit V :- Boat and streams, Allegations and Mixtures, and Calendar (Lecture – 8)

a) Boat and streams: Concept of boat and streams, Formulae of boat and streams, Theoretical problems on boat and streams. b) Allegations and Mixtures: Definition of allegation and mixtures, Rules of allegation's, Theoretical problems on mixture and allegation. c) Calendar: Concept of odd days, Leap years and ordinary years, Problems on Calendar.

UNIT VI:- Simple and Compound Interest, Probability, and Permutations and combinations   **(Lecture – 8)**

a) Simple and Compound Interest: Definition of simple and Compound interest, Formulae of simple and compound interest, Relationship between simple and compound interest, Theoretical problems on simple and compound interest. b) Probability: Definition of probability, Examples of performing a random experiment, Probability of occurrence of an event, Results on probability, Theoretical problems on probability. c) Permutations and combinations: Definition of permutations and combinations, Formulae of permutation and combinations, Relationship between permutation and combinations, Problems on permutations and combinations.

References

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

3) Objective Arithmetic by S.L Gulati, Cosmos book hive Pvt,5th edition2015

Online References

1. www.indiabix.com/aptitude.questions-and-answer
2. www.practiceaptitudetests.com
3. www.allindiaexams.in

LAB/ Practical

C++ Programming -BCS -306

List of Practicals

1. Write a program for defining a class and object

2. Write a program to implement the concept of reference variable

3. Write a program to implement the concept of scope resolution operator

4. Write a program to implement the concept of inline function

5. Write a program to implement the concept of default argument

6. Write a program to implement the concept of static data members

7. Write a program to implement the concept of function overloading

8. Write a program to implement the concept of call by reference

9. Write a program to implement the concept of return by reference

10. Write a program to implement the concept of parameterized constructor

11. Write a program to implement the concept of overloading unary operator

12. Write a program to implement the concept of overloading binary operator

13. Write a program to implement the concept of single inheritance

14. Write a program to implement the concept of Multilevel inheritance

15. Write a program to implement the concept of Multiple inheritance

LAB/ Practical

Data Structure and Algorithms -BCS -307

List of Practical (write all the programs using C++ language)

1. Write a recursive and non recursive program to calculate the factorial of a number.

2. Write a recursive and non recursive program to display the Fibonacci sequence.

3. Write a program to calculate sum of ten numbers using array

4. Write a Program to perform linear search for a given value in a unsorted list.

5. Write a Program to perform Binary search for a given value in a sorted list.

6. Write a Program that implement Bubble sort, to sort a given list of integers in ascending order

7. Write a Program that implement Selection sort, to sort a given list of integers in ascending order

8. Write a Program that implement Insertion sort, to sort a given list of integers in ascending order.

9. Write a Program that uses functions to' perform insertion operation on a singly linked list.

10. Write a Program that uses functions to perform deletion operation on a singly linked list.

11. Write a Program that implement stack and its operations (push and pop) using arrays.

12. Write a Program that implement stack and its operations (push and pop) using Linked list

13. Write a Program that implement Queue and its operations (insertion and deletion) using arrays.

14. Write a Program that implement Queue and its operations (insertion and deletion) using linked lists

15. Write a Program to implement Priority Queues using arrays.

Fourth Semester

Paper Title- Programming in JAVA

BCS -401

Course objective:-

- To learn the basic concepts of java programming

- To understand how to use programming in day to day applications

- Knowledge of object-oriented paradigm in the Java programming language,

- The use of Java in a variety of technologies and on different platforms.

Course outcome:-

- The knowledge of the structure and model of the Java programming language.

- To use the Java programming language for various programming technologies

- To develop software in the Java programming language.

UNIT-I Introduction   **(Lecture – 6)**

Java History ,Java Features , How Java Differ from C and C++, **Architecture of JVM** , **Java and Internet**Java Environment ,Java Programming Structure.

UNIT-II Overview of Java Language   **(Lecture – 6)**

Introduction, Types of Comment , Java Tokens - Reserve Keywords - Identifiers - Literals - Operators, Variables, **final variable**, Data Types, Array , Type Casting , Control Statement - Branching statement - Looping statement

UNIT-III Classes, Objects and Methods   **(Lecture – 8)**

Introduction, Defining Class - Fields Declaration - Methods Declaration - Creating Objects - Visibility Control , Use of 'this' Keyword , Method Parameters , Method Overloading , Constructor and Constructor Overloading , Static Members , **Finalize()** Method , Inheritance

and It's Types ,**super** Method Overriding , Final Method and Final Class, **Abstract Class and Abstract Methods.**

UNIT-IV Interface, Package and Exception Handling   (Lecture – 6)

Defining and implementing interface , Inner Classes ,Package - Create Package - Accessing Package ,Exception - Types of Error –**try and catch**,Multiple catch statement , Finally clause, Creating User defined Exception,

UNIT-V String and Stream   (Lecture – 6)

Introduction ,String Classes ,String Buffer Class , Stream Classes - Types of Streams - Byte Stream Classes - Character Stream Classes,

UNIT-VI File I/O and JDBC   (Lecture – 6)

Creating Files and Directory, Reading and Writing to Files , Date & Times , Regular Expression , Serialization & Deserialization , Introduction to JDBC, Architecture of JDBC, JDBC Drivers,**Statement, PreparedStatement,ResultSet, ResultSetMetaData,** Create,Update and Delete operations.

References:

1 Complete Reference Herbert Schildt Tata McGraw- Hill Publishing company Ltd. 2 Java

2 programming black books Steven HorlznerDreamTech Press

3 Core Java Volume-IFundamentals Eighth Edition Cay S. Horstmann, Gary Cornell, Prentice Hall Sun Microsystems Press

4 Programming with Java E BalagurusamyThe McGraw Hill Education Pvt. Ltd. New Delhi

Paper Title – Software Engineering
BCS-402

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

UNIT-I - Introduction to Software Engineering   (Lecture – 7)

The Evolving Role of Software ,Software ,Software Characteristics ,Software Applications ,Software Evolution ,Software Crisis & Horizon ,Software Myths

UNIT-II - Process Of Software   (Lecture – 7)

Software Engineering ,Software Process , The Waterfall Model ,Incremental Process Models

Evolutionary Process Models ,Spiral Model

UNIT-III - A Generic View of Process   (Lecture – 7)

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

UNIT-IV - AGILE DEVELOPMENT   (Lecture – 7)

What Is Agility? ,What Is an Agile Process? ,The Politics of Agile Development , Agile Process Models , Feature Driven Development (FDD)

UNIT-V - Software Engineering Practice   **(Lecture – 7)**

Software Engineering Practice ,The Essence of Practice ,Core Principles ,Communication Practices ,Planning Practices ,Modeling Practices ,Analysis Modeling Principles ,Design Modeling Principles

UNIT-VI - System Engineering   **(Lecture – 7)**

Computer-Based Systems ,The System Engineering Hierarchy ,System Modeling ,System Simulation

References:

1 Software Engineering R.Pressmen M C Graw Hill

2. Software Engineering 7th / 8th Edition IAN Sommerville Pearson Edition

Paper Title :-Relational Database Management System

BCS-403

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   **(Lecture – 7)**

a) Structure of DBMS b) Advantages and Disadvantages of DBMS c) Users of DBMS d) Relational Database: Entities, Attributes and Domains e) Tuples, Relations and their schemes.

Unit – II SQL Statements & Working With Tables   **(Lecture – 7)**

a) What is SQL? b) Types of SQL Commands (DDL, DML, DQL, DCL, Transaction Control Commands (TCL) c) Data types in SQL d) Creating Tables e) Selecting from tables, WHERE Clause f) Selecting from tables, DISTINCT Clause, Column aliasing g) Manipulation Table data h) Altering Table structure i) Data Constraints: Unique, Not Null, Primary Key, Foreign Key, Check, Default Constraint

Unit – III . Operators & SQL Functions & Views   **(Lecture – 7)**

a) Arithmetic Operators, Relational Operators b) Comparison Operators BETWEEN , IN, LIKE, IS NULL c) LOGICAL Operators: AND OR NOT d) SQL Functions: Single, Multiple Row Functions e) Single Row Character , Single Row Number, Single Row Date, Single Row Conversion, Single Row General Functions f) Multiple Row Functions g) Views

Unit – IV 4. Sorting & Grouping Data and Joining Tables & Subqueries in ORACLE (Lecture – 7)

a) What is Sorting? b) ORDER BY & ORDER BY DESC Clauses c) GROUP BY & GROUP BY HAVING Clauses d) What is Join? Join Styles: Theta , ANSI , Using clause e) Types of Joins: Equi Joins, Non Equi Join, Outer Join: Left, Right, Full f) Self Join Cross Join, Joining three tables g) Subqueries & its types

Unit – V 5. Introduction to PL/SQL   (Lecture – 6)

a) PL/SQL Overview   b) Declarations Section   c) Executable Commands Section   d) Exception Handling Section

Unit – VI 6. Database Triggers & Cursors   (Lecture – 6)

a) What are Triggers? Triggers Syntax b) Types of triggers Row Level Statement Level, Before , After Instead of Triggers c) Enabling and Disabling Triggers Replacing and Dropping Triggers d) Working with Cursor % TYPE Variable % ROWTYPE Variable

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 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 ISBN81-7656964-

Paper Title:- Principle of Compiler Design

BCS-404A (Elective)

Course Objectives

1) To understand overall design of compiler with their types and phases.
2) To understand the basic concept of essential syntactic elements and identifying those elements.
3) One can easily construct the recognizer system for language constructs as a input.
4) Understanding context free grammar.
5) Understanding various parsing techniques and intermediate code.

Unit 1 Introduction   (Lecture – 7)

Definition of compiler ,Compiler and translators ,Need of translator ,Phases of compiler ,Lexical analysis, Syntax analysis ,Intermediate code generation ,Optimization ,Code generation ,One pass and multi pass compiler ,Cross compiler , Bootstrapping

Unit 2 Basic Elements of Programming Language   (Lecture – 7)

High level programming languages ,Definition of programming languages ,Lexical and syntactic structure of language ,Data elements, Different data structures ,Operators , Assignments, Statements

Unit 3 Lexical analysis and introduction to Finite Automata   (Lecture – 7)

Role of lexical analyzer and input buffering ,An approach to design lexical analyzer ,Finite automata – NFA and DFA ,Regular Expression ,Conversion of regular Expression to Finite automata ,Minimizing the number of states of DFA ,A language specifying lexical analyzer

Unit 4 Language syntactic specification & parsing techniques   (Lecture – 7)

Context free grammar , Parse tree ,Capabilities of context free grammer ,Parsers ,Shift reduce parsing ,Operator precedence parsing ,Top down parsing ,Predictive parsers ,LR parsers

Unit 5 Syntax Directed translation & Intermediate code generation   (Lecture – 7)

Syntax directed definitions ,Implementation of syntax directed translator ,Intermediate code ,Postfix notation ,Evaluation of postfix notation ,Parse tree and syntax tree

Unit 6 Introduction to Errors and code optimization   (Lecture –6)

Errors, Lexical base errors ,Syntactic phase errors ,Semantic errors ,Sources of optimization ,Loop optimization

Reference. Books

1) Compiler constructions :-   Dhamdere(Mc-Millan)
2) Compiler – principles, techniques and tools :- A.V. Aho R. Sethi and J.D. Ullman

Ref. reading books other than syllabus to understand basic concepts like types of grammars, elements of programming languages, BNF notations.

1) Programming languages : Design and Implementation :- Terrance W. Pratt, Marvin V. Xelkowitz and T.V. Gopal

Paper Title :- Essentials of Computer Security

BCS-404 B (Elective)

Course Objective:-

- To understand basic principles of computer security

- To understand various design approach of computer security

- To understand various standards of computer security

Course Outcomes:-

- To develop a basic understanding of cryptography

- To develop a basic understanding of security policies.

- To develop a basic understanding of authentication and access control

- To determine mechanism for protecting information

Unit I : Computer Security Concepts   (Lecture – 7)

A Definition of Computer Security, The Challenges of Computer Security, A Model for Computer Security , Threats and Attacks, Threats and Assets, Fundamental Security Design Principles.

Unit II : Cryptographic Tools   (Lecture – 7)

Symmetric Encryption , Asymmetric Encryption , Public-Key Encryption Structure, Digital Signature,Digital Envelopes.

Unit III : User Authentication   (Lecture – 7)

A Model for Electronic User Authentication , Means of Authentication, The Vulnerability of Passwords , Physical Characteristics Used in Biometric Applications, Password Selection Strategies

Unit IV : Access Control   **(Lecture – 7)**

Access Control Principles-   Access Control Context, Access Control Policies ,   Subjects, Objects, and Access Rights , Role-Based Access Control

Unit V:- Database Security   **(Lecture –6)**

The Need for Database Security , Database Management Systems,   Relational Databases, Database Encryption.

Unit VI:- Intrusion Detection   **(Lecture – 6)**

Intruders , Intruder Behavior , Intrusion Detection, Analysis Approaches, Intrusion detection techniques..

Reference Book:-

1. Computer Security Principles and Practice (Third Edition) by William Stallings Lawrie Brown Pearson Publication

University recognized MOOC (NPTEL / SWAYAM / others) OR Intra / Inter Departmental courses

OR

BCS -405 B (open Elective) Paper Title:-Logical Reasoning

Course Objective:

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

Course Outcome:-

- Identify logical relations among statements.
- Analyse logically complex statements into their truth functional or quantificational components
- This enable students to develop their ability to reason by introducing them to elements of formal reasoning

UNIT I 1 Series, Analogy and Classification   (Lecture 7)

A Series: Types of series, Alphabet series, Alpha numeric series, Examples on continues pattern series.

Analogy: Completing the Analogous Pair, Direct/Simple Analogy, Choosing the Analogous Pair, Double Analogy, Number analogy, Alphabet analogy, Correlation between letters/numbers.

Classification: Choosing the odd word, Choosing the odd numeral, Choosing the odd letter group

UNIT II 2 Coding-Decoding   (Lecture 7)

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

UNIT III 3 Blood Relation   **(Lecture 7)**

A Introduction to relations

 B Concepts of deciphering relations based problems

 C Problems on deciphering jumbled up descriptions

 D Relation puzzle

 E Coded relations.

UNIT IV 4 Seating or Placing Arrangement

A Problems based on linear and circular based arrangement

UNIT V :- Direction Sense Test   **(Lecture 7)**

A Introduction

 B Problems based on angular changes in direction

C Problems on Shadows

 D General Problems based on Pythagoras Theorem

UNIT VI Syllogism and Data Sufficiency   **(Lecture 7)**

A Syllogism: Introduction of logic, Rules of syllogism, Two statement problem, Three statement problem B Data Sufficiency: Problems of Data sufficiency based on all Chapters.

Reference Books:-

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

3.Test of Reasoning Edgar Thorpe McGraw Hill Education

4.www.practiceaptitudetests.com

5. www.allindiaexams.in

Lab : RDBMS

BCS-406

1) What is SQL? Types of SQL Commands

2) Study of Datatypes in ORACLE 3

3) Creating Tables & Retrieving , Manipulating Data from tables

4) Study of Altering Tables IN ORACLE

5) Study of Data Constraints in ORACLE

6) Study of Operators

7) Study of SQL Functions

8) Study of Views in ORACLE

9) Study of Joining Tables in ORACLE

10) Study of Subqueries in ORACLE

11) Study of in PL/SQL Blocks in ORACLE

12) Study of in Triggers in ORACLE

13) Study of in Cursors in ORACLE

Lab : Java Programming

BCS-407

PRACTICAL List:

1) Program to demonstrate Constant Variable.

 2) Program to demonstrate scope of Variable

3) Program to demonstrate branching statement

 4) Program to demonstrate Looping statement

5) Program to demonstrate simple class

 6) Program to demonstrate method parameter

7) Program to demonstrate method overloading

8) Program to demonstrate constructor

 9) Program to demonstrate static member

10) Program to demonstrate Method overriding

11) Program to demonstrate Final variable, Method and Final Class.

 12) Program to demonstrate Finilize method()

13) Program to demonstrate Array and It's types.

14) Program to demonstrate String class and it's method.

 15) Program to demonstrate String Buffer and it's method