Nagindas Khandwala College

(Autonomous)

Revised Syllabus
And
Question Paper Pattern
Of Course
Of
Bachelor of Science (BSC CS & IT) Programme

Department Of IT/Computer Science
First Year
Semester II

(To be implemented from Academic Year- 2019-2020)

Bachelor of Science (BSC CS/IT) Program

Under Choice Based Credit, Grading and Semester System

Course Structure

FYBSC CS/IT

(To be implemented from Academic Year- 2019-2020)

FYBSC CS/IT – SEMESTER II						
Course	**Hrs. of Instruction/Week**	**Exam Duration (Hours)**	**Maximum Marks**			**Credits**
			CIE	**SEE**	**Total**	
Core 1 Programming and Application Development in Python	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**
Core 2: Object Oriented Programming	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**
Core 3: Database Management Systems I	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**
Skill Enhancement: Web Programming II	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**
Allied: Discrete Mathematics II	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**2**
Core 1 Practical: Programming and Application Development in Python	**2**	**2 Hours**	**-**	**50**	**50**	**1**

Core 2 Practical: Object Oriented Programming	**2**	**2 Hours**	**-**	**50**	**50**	**1**
Core 3 Practical: Database Management Systems I	**2**	**2 Hours**	**-**	**50**	**50**	**1**
Skill Enhancement Practical: Web Programming II	**2**	**2 Hours**	**-**	**50**	**50**	**1**
Ability Enhancement Practical: IT platforms, Tools and Practices	**2**	**2 Hours**	**25**	**75**	**100**	**2**
TOTAL	**30**				**800**	**20**

Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Core 1 Programming and Application Development in Python	4	2 ½ hrs	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	GUI Programming in Python (using Tkinter/wxPython/Qt): What is GUI, Advantages of GUI, Introduction to GUI library, Layout management, events, and bindings, fonts, colors, drawing on canvas (line, oval, rectangle, etc.). Widgets such as: frame, label, button, checkbutton, entry, listbox, message, radiobutton, text, spinbox etc.
2	**UNIT 2**
	Database connectivity in Python: Installing mysql connector, accessing connector module using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements,executing transactions, understanding exceptions in database connectivity.
3	**UNIT 3**
	Python File Input-Output: Opening and closing files, various types of file modes,reading and writing to files, manipulating directories. Iterables, iterators and their Problem solving applications. Python Modules and Packages,Lambda function.
4	**UNIT 4**
	Regular Expressions: Concept of regular expression, various types of regular expressions, using match function. **Python and the Web**: Screen scraping, Web Scraping (Using Scrapy/Selinium/BeautifulSoup etc.).
5	**UNIT 5**

	Network connectivity: Socket module, creating server-client programs, sending Email, reading from URL **Project:** Semester end project.

Reference Books

Programming and Application Development in Python

Text book:

1. Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014
2. Python Programming for the Absolute Beginner by Michael Dawson Paperback, Second Edition, 472 pages Published November 8th, 2005 by Course Technology PTR
3. James Payne, Beginning Python: Using Python 2.6 and Python 3, Wiley India, 2010

Practical

1. Programs to read and write files.
2. Programs with iterables and iterators.
3. Program to connect to a DB and execute various SQL queries.
4. Program to demonstrate the use of regular expressions.
5. Program to show draw shapes & GUI controls. (Mini project including database connectivity)
6. Program to create server-client and exchange basic information.
7. Use Scrapy/Selinium/BeautifulSoup for web mining.
8. Program to send email & read contents of URL.

Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Core 2: Object Oriented Programming	4	2 ½ hrs	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	Introduction: A look at Procedure-Oriented Programming, OOP Paradigm, Basic concepts of OOP, Benefits of OOP, OOP Languages, Applications of OOP. **Objects Everywhere:** Recognizing objects from nouns, Generating blueprints for objects, Recognizing attributes/behaviour, Recognizing actions from verbs – methods, Organizing the blueprints – classes using UML diagrams.
2	**UNIT 2**
	Classes and Objects: Understanding classes and objects, Understanding constructors and destructors, Creating classes, Customizing constructors, Customizing destructors, Creating objects of classes
3	**UNIT 3**
	Encapsulation of Data: Understanding the different members of a class, Protecting and hiding data, Adding attributes to a class, Adding properties to a constructor function, Hiding data using prefixes, Using access modifiers, Using property getters and setters, Using methods to add behaviours to classes.
4	**UNIT 4**
	Inheritance and Specialization: Using classes to abstract behaviour, Understanding inheritance, Polymorphism, Understanding method overloading and overriding, Understanding operator overloading, Taking advantage of polymorphism.
5	**UNIT 5**
	Interfaces, Multiple Inheritance, and Composition : Understanding the requirement to work with multiple base classes, Working with multiple inheritance, Declaring base classes for multiple inheritance, Declaring classes that override methods, Declaring a class with multiple base classes, Working

	with objects of classes that use multiple inheritance, Working with abstract base classes. **Data Visualization:** Introduction, History, Importance, Benefits, Data visualization in today's world, How it is used, How it works.

Reference Books

Object Oriented Programming

References:

1. Learning Object-Oriented Programming, Gaston C. Hillar, Packt, 1st Edition, 2015.
2. Python 3 Object-oriented Programming, Dusty Phillips, Packt, 2nd Edition, 2015.
3. The Object-Oriented Thought Process, Matt Weisfeld, 3rd Edition, 2009
4. https://www.sas.com/en_in/insights/big-data/data-visualization.html
5. https://realpython.com/python3-object-oriented-programming/#how-to-define-a-class-in-python

Practical

1. Creating Class diagram with the abstract class, subclasses, their attributes and methods.
2. Defining and using a class.
3. Defining methods with and without attributes in a class.
4. Creating and using constructor and Destructor.
5. Using property getters and setters.
6. Implementing various forms of Inheritance.
7. Implementing Polymorphism by Overloading Overriding methods.
8. Implementing concept of Operator Overloading.
9. Implementing abstract classes and interfaces.
10. Implementing concept of Composition.

Course	Hrs. of Instruction /Week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Core 3: Database Management Systems I	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**

Sr. No.	Modules / Units
1	**UNIT 1**
	Introduction to DBMS: Definition, Overview of DBMS, Advantages of DBMS, Purpose of Database Systems, View of Data, Database Languages, , Levels of abstraction, Data independence, DBMS Architecture, Limitation of DBMS, Introduction of NoSQL, Comparison between DBMS and RDBMS. **Data Models:** The importance of data models, Basic building blocks, Business rules, Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network), Degrees of data abstraction.
2	**UNIT 2**
	ER-Diagram : Database design and ER Model: Overview, ER-Model, Constraints, ER Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas **Relational Database design**: Features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF). **Relational Algebra:** Operations - selection, projection, Set operations-union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division operator
3	**UNIT 3**
	Joining tables: Inner, Equi , Outer , Cross and Self join **Sub queries:** Sub queries with IN, EXISTS, correlated sub queries, queries with modified comparison operations, SELECT INTO operation, UNION operation. Sub queries in the HAVING clause

	Views: Meaning of view, Data independence provided by views, creating, altering dropping, renaming and manipulating views using SQL.
4	**UNIT 4**
	Transaction Management and Concurrency Control: Concept of a transaction, ACID properties, Serial and serializable schedules, Conflict and View Serializabilty, Precedence graphs and test for conflict seralizability. **Enforcing serializability by locks:** Concept of locks, the locking scheduler, Two phase Locking, upgrading and down grading locks, Concept of dead locks, Concurrency control by time stamps, The Thomas Write rule. **Crash Recovery:** ARIES algorithm, The log based recovery, recovery related structures like transaction and dirty page table, check points, recovery from a system crash.
5	**UNIT 5**
	Introduction to SQL : SQL commands - Data Definition Language Commands, Data Manipulation Language Commands, The Data types a cell can hold; insertion of data into the tables; Viewing of data into the tables; Deletion operations; updating the contents of the table; modifying the structure of the table; renaming table; destroying tables; Data Constraints; Type of Data Constraint; Column Level Constraint; Table Level Constraint; Null value Concepts; The UNIQUE Constraint; The PRIMARY constraint; The FOREIGN key constraint; The CHECK Constraint; Viewing the User Constraints. **Viewing The Data :** Computations on Table Data; Arithmetic Operators; Logical Operators; Comparison Operators; Range Searching; Pattern Searching. **Functions:** Aggregate function, Date function, String functions.

Reference Books

Database Management Systems I

1) Ramakrishnam, Gehrke, “Database Management Systems”, McGraw- Hill.

2) Ivan Bayross, “SQL,PL/SQL -The Programming language of Oracle”, B.P.B. Publications

3) Elsmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education.

Practical

1. Draw ER diagram for the given scenario and convert it into table.
2. Study of Data Definition Language Statement
3. Study of Data Manipulation Language Statement
4. Study of various type of JOINS.
5. Study of subqueries with all its clauses.
6. Study of various types of SET OPERATORS.
7. Study of various types of views.
8. Study of different functions.
9. Study of Transaction (Commit/ Rollback), Locks
10. Implementing deadlocks.

Course	Hrs. of Instruction /Week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Skill Enhancement: Web Programming II	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**3**

Sr. No.	Modules / Units
1	**UNIT 1**
	XML : Introduction to XML, Anatomy of an XML document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL
2	**UNIT 2**
	PHP: Introduction of PHP, Server-side scripting. **PHP BASICS**:PHP syntax and variables, comments, types, constants, control structures, branching, looping, termination, functions, arrays, passing information with PHP, GET, POST
3	**UNIT 3**
	PHP: formatting form variables, superglobal arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems, working with files and operating systems.
4	**UNIT 4**
	Advanced PHP and MySQL : MYSQL basics, PHP/MySQL Functions, Integrating web forms and databases, authenticating your users, Displaying queries in tables.
5	**UNIT 5**
	Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, handling file uploads **networking-** E-Mail, securing your website, **XML parsing**

Reference Books

Web Programming II

1. XML: The Complete Reference –Heather Williamson.
2. Beginning php and mysql from novice to professional 4th edition
3. MySQL-PHP Database Applications.
4. Practical PHP and MySQL, Jono Bacon, Prentice Hall.

Practical

1. XML
   a. Design a DTD, corresponding XML document and display it in browser using CSS.
   b. Design an XML document and display it in browser using XSL.
   c. Design XML Schema and corresponding XML document.
2. PHP Basics-II
   a. Write a PHP Program to accept a number from the user and print it factorial.
   b. Write a PHP program to accept a number from the user and print whether it is prime or not.
3. PHP Basics- II
   a. Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.
   b. Write a PHP program to display the following Binary Pyramid:
      1
      0 1
      1 0 1
      0 1 0 1.
4. String Functions and arrays
   a. Write a PHP program to demonstrate different string functions.
   b. Write a PHP program to create one dimensional array.
5. PHP and Database
   a. Write a PHP code to create: (i) Create a database College (ii) Create a table Department (Dname, Dno, Number_Of_faculty)
   b. Write a PHP program to create a database named "College". Create a table named "Student" with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular format.
   c. Design a PHP page for authenticating a user.
   d. Write a program to send email with attachment
6. Write a program to demonstrate use of sessions and cookies.
7. Create a shopping cart using php and Mysql.
8. Write a program to demonstrate XML parsing with php.
9. Design a web page demonstrating Platform as a service (PAAS) with google cloud.
10. Demonstrate json with php.

Course	Hrs. of Instruction /Week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Allied: Discrete Mathematics II	**4**	**2 1/2 Hours**	**25**	**75**	**100**	**2**

Sr. No.	Modules / Units
1	**UNIT 1**
	Matrices: Introduction, Matrix Arithmetic, Properties of matrices, Transposes and Powers of Matrices, Inverse of a matrix, Elementary transformation, Rank of matrix, Echelon or normal form, Linear equations, Linear dependence and independence of vectors. **Determinants :**.General definition, determinants and inverses of 2 x 2 matrices, Properties of determinants.
2	**UNIT 2**
	Linear Transformation of matrices : Characteristics roots and characteristics vectors, their properties, Cayley-Hamilton theorem, Similarity of matrices, Reduction of matrix to a diagonal matrix. **Counting Principles:** Sum and Product Rules, Two-way counting, Tree diagram for solving counting problems, Pigeonhole Principle (without proof); Simple examples, Inclusion Exclusion Principle (Sieve formula) (Without proof).
3	**UNIT 3**
	Permutations and Combinations: Partition and Distribution of objects, Permutation with distinct and indistinct objects, Binomial numbers, Combination with identities: Pascal Identity, Vandermonde's Identity, Pascal triangle, Binomial theorem, Combination with indistinct objects.
4	**UNIT 4**
	Graphs: Definition and elementary results, Adjacency matrix, path matrix, Representing relations using diagraphs, Warshall's algorithm-shortest path , Linked representation of a graph, Operations on graph with

	algorithms – searching in a graph; Insertion in a graph, Deleting from a graph, Traversing a graph- Breadth-First search and Depth-First search.
5	**UNIT 5**
	Trees: Definition and elementary results. Ordered rooted tree, Binary trees, Complete and extended binary trees, representing binary trees in memory, traversing binary trees, binary search tree, Algorithms for searching and inserting, traversing binary trees, binary search tree, Algorithms for searching and inserting, in binary search trees, Algorithms for deleting in a binary search tree

Reference Books
Discrete Mathematics II
1. Discrete Mathematics with Applications, Sussana S. Epp, Cengage Learning, 4th Edition, 2010. 2. Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz, Tata McGraw Hill, 2007. 3. Discrete Mathematics and its Applications, Kenneth H.Rosen, Tata McGraw Hill, 2015. 4. Discrete Mathematical Structures, 6th Ed., Kolmann R. C. Busby, S. Ross, PHI, 2009. 5. Elements of Discrete Mathematics, 4th Ed., C. L. Liu, D. P. Mohapatra, Tata McGraw Hill, 2012.

Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
			CIE	SEE	Total	
Ability Enhancement: IT platforms, Tools and Practices	2	2 hrs	25	75 (Pr.)	100	2

Sr. No.	Modules / Units
1	**UNIT 1**
	Free and Open Source Softwares **Introduction:** Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project. **GitHub:** Introduction to GitHub, preparing the environment: Install Git on our machine, create a GitHub account, create a workspace on our machine **GitHub workflow and the environment**: Creating a repository, creating workspace, cloning the repository, creating a branch, committing the changes, merging the changes, Introduction to **Wikipedia**, contributing to Wikipedia
2	**UNIT 2**
	Coding Practices: Variable Naming Conventions, Constant Naming Conventions, Indentations, General Practices, Commenting, Advantages of Coding guidelines, pair programming/code review, Refactoring, Reduction of Complexity, JavaScript best Practices, Java best Practices, Python best Practices, Python best practices (PEP 8), Code analysis tools (Pylint)
3	**UNIT 3**
	Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.
4	**UNIT 4**

	Social Media Platforms: Case study on Google docs, Facebook, Blogs(WordPress or Blogger), Youtube, Twitter, Storify, Instagram, LinkedIn, TedEd etc
5	**UNIT 5**
	Green Computing **Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Low-Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software. **Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles. **Green Data Storage:** Introduction , Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management

Practical
1. Create a project, repository and workspace in GitHub. 2. Clone the Repositories in GitHub. 3. Creating a branch in GitHub. 4. Committing the changes in GitHub. 5. Merging the changes in GitHub. 6. Working on Wikipedia. 7. Implementing coding practices in Python using Pylint. 8. Implementing coding practices in Python using PEP8. 9. Implementing coding practices in Java. 10. Implementing coding practices in JavaScript.

Reference Books
IT platforms, Tools and Practices

REFERENCES:

Unit1-

1. Open Source Initiative: https://opensource.org/
2. Github: https://help.github.com/
3. https://medium.freecodecamp.org/how-you-can-learn-git-and-github-while-youre-learning-to-code-7a592ea287ba
4. https://medium.com/quick-code/top-tutorials-to-learn-git-for-beginners-622289ffdfe5
5. Wikipedia: https://en.wikipedia.org/

Unit 2:

1. https://developer.mozilla.org/en-US/docs/Mozilla/Developer_guide/Coding_Style
2. https://www.castsoftware.com/glossary/coding-in-software-engineering-best-practices-good-standards

Unit 3&4:

1. Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 2007.
2. Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010.

Unit 5-

11. Toby Velte, Anthony Velte, Robert Elsenpeter, Green IT, McGraw Hill, 2008
12. Alvin Galea, Michael Schaefer, Mike Ebbers, Green Data Center: Steps for the Journey, Shroff Publishers and Distributers, 2011

Evaluation Scheme

I. Internal Exam-25 Marks

(i) Test– 20 Marks - Duration 40 mins

It will be conducted either as a written test or using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment) Or a test based on an equivalent online course on the contents of the concerned course(subject) offered by or build using MOOC (Massive Open Online Course)platform.

(ii) **5 Marks -** Active participation in routine class instructional deliveries**:** Overall conduct as a responsible student, manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.

II. External Examination- 75 Marks

(i) Duration - 2.5 Hours.

(ii) Theory question paper pattern:-

All questions are compulsory.		
Question	Based on	Marks
Q1	Unit 1, 2, 3, 4, 5	4 out of 5 questions (05 marks each)
Q2	Unit 1, 2, 3, 4, 5	3 out of 5 questions (07 marks each)
Q3	Unit 1, 2, 3, 4, 5	3 out of 5 questions (08 marks each)
Q4	Based on multiple Units	1 out of 2 questions (10 marks)

III. Practical Examination – 50 marks (Duration: 2 Hours)

- Each practical course carries 50 Marks : 40 marks + 05 marks (journal)+ 05 marks(viva)
- Minimum 75% practical from each core/allied course are required to be completed and written in the journal**.**

(Certified Journal is compulsory for appearing at the time of Practical Examination)