Nadindas Khandwala College

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

(Department Of IT) First Year
Semester I

Under Autonomy

(To be implemented from Academic Year- 2017-2018)

Bachelor of Computer Science (BSC CS) Program

Under Choice Based Credit, Grading and Semester System

Course Structure

FYBSC IT

(To be implemented from Academic Year- 2017-2018)

FYBSC CS – SEMESTER I							
Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1711UITBC	Part 1 Business Communication	3	2 1/2 Hours	25	75	100	3
1712UITIP	Core Subject: Introduction to Programming	4	2 1/2 Hours	25	75	100	3
1713UITDL	Core Subject: Digital Logic Design	4	2 1/2 Hours	25	75	100	3
1714UITOS	Core Subject: Operating Systems	4	2 1/2 Hours	25	75	100	3
1715UITDM	Allied Subject : Discrete Mathematics	4	2 1/2 Hours	25	75	100	3
1711UITPR	PART I Practical: Communication Skills Practical	2	2 Hours		50	50	1
1712UITPR	Core Subject Practical 1 : Introduction to Programming	2	2 Hours		50	50	1

	Practical						
1713UITPR	Core Subject Practical 2: Digital Electronics Practical	**2**	**2 Hours**		**50**	**50**	**1**
1714UITPR	Core Subject Practical 3: Operating Systems Practical	**2**	**2 Hours**		**50**	**50**	**1**
1715UITPRP	Allied Subject Practical: Discrete Mathematics Practical	**2**	**2 Hours**		**50**	**50**	**1**
	TOTAL	**29**					**20**

Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1711UITBC	**Part 1:** **Business Communication**	3	2 ½ hrs	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	The Seven Cs of Effective Communication: Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness **Understanding Communication**: Nature and Scope of Communication, Methods of communication, Cross-culturalcommunication, Technology-enabledBusiness Communication
2	**UNIT 2**
	Writing Business Messages and Documents: Business Correspondence: Letter of inquiry, letter of order, letter of complaints, sales letter, business reports, resume writing
3	**UNIT 3**
	Developing Oral Communication Skills: Effective Listening, Business Presentations and Public Speaking, Conversations, Interviews, meetings and conferences, group discussions
4	**UNIT 4**
	Business ethics: Importance of business ethics, personal integrity at work place, computer ethics, corporate social responsibility
5	**UNIT 5**
	Business Presentation: Principles of effective presentation, brain storming and graphic/visual aids, use of graphics in presentation, effective use of presentation tools.

Reference Books
Business Communication
Reference book: 1. Meenakshi Raman and Prakash Singh, Business Communication, Oxford University Press, 2nd Ed. 2. Aruna Koneru, Professional Communication, Tata McGraw Hill 3. M. S. Rao, Strategies for Improving Your Business Communication, Shroff Publishers and Distributors

Practical (1711UITPR)
1. Communication Origami, Guessing Game, Guessing the emotion 2. Body Language, Follow All Instructions, Effective Feedback Skills 3. The Name Game, Square Talk (Effective Communication), Room 101 (Influential and persuasive skills) 4. Back to Back Communication, Paper Shapes (Importance of two-way communication), Memory Test(Presentation Skills) 5. Exercises on Communication Principles 6. Exercises on communication icebreakers 7. Communication exercises For the following practicals, Microsoft Office, Open Office, Libre Office or any other software suite can be used. 8. Use of word processing tools for communication 9. Use of spreadsheet tools for communication 10. Use of presentation tools for communication

Course Code:	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1712UITIP	Introduction to Programming	4	2 ½ hrs	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	Strategies for problem solving: Classic Puzzles: How to cross the river with fox, goose and corn, The sliding eight, sliding five, completing a Sudoku square, Quarrasi lock (Implementation through scratch)
2	**UNIT 2**
	General problem solving techniques: Always have a plan, restate the problem, divide the problem, Start with What You Know, Reduce the problem, Look for analogies, experiment, Don't get frustrated Output method, Output patterns: Half of a square, count down by counting up, sideways triangle
3	**UNIT 3**
	Input processing: convert character digit to integer, checksum validation, positive or negative, decode a message List: store, copy, search, sort, find mean/median/mode Exception handling: need, try and except keywords
4	**UNIT 4**
	Function: introduction, function definition, parameters, function call Recursion: parrot counting, finding the highest revenue customer, iterative sum of list elements
5	**UNIT 5**
	Searching and Sorting: Searching-Linear Search, Binary Search, Sorting-Bubble, Selection and Insertion Sort, Working with Sorted Lists-Maintaining Sorted Lists Algorithm Analysis: Complexity Analysis- Asymptotic notations, Evaluating Python Code

Reference Books

Introduction to Programming

Text book:

1. V. Anton Spraul, Think like a Programmer: An Introduction to Creative problem Solving, No Starch press Inc, 2012
2. Magnus Lie Hetland, Beginning Python: From Novice to Professional, Apress
3. Paul Gries, Practical Programming: An Introduction to Computer Science Using Python3, Pragmatic Bookeshelf, 2nd Edition, 2014

Additional References:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, How to Think Like a Computer Scientist: Learning with Python 3 Documentation, Release 3rd Edition, 2012

David Evans, Introduction to Computing: Explorations in Language, Logic, and Machines, Creative Commons, 2011

Practical (1712UITPR)

1) Write a Scratch program for (any one):
    a) How to cross the river with fox, goose and corn
    b) The sliding eight
    c) sliding five
2) Write Python program for printing the patterns
3) Write Python program to check:
    a) Whether the given number is odd or even
    b) whether the given year is a leap year
4) Write Python program to convert:
    a) character digit to integer
    b) decimal number to binary or hexadecimal
5) Write Python program to check:
    a) whether the given string is a palindrome or not
    b) whether the given number is a prime number or not
6) Write Python program to find:
    a) The nth Fibonacci number
    b) Factorial of a given number
7) Write Python program to convert read a line of text and count
    a) the number of letters
    b) number of words
8) Write Python program to read a list of values and determines the quartiles
9) Write a Python function to check whether the list is sorted in one pass.
10) Write Python functions to encode and decode a message
11) Write a python function to find the sum of positive integers in a list
    a) Iteratively
    b) recursively
12) Write a function to implement:
    a) binary search
    b) tower of Hanoi

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1713UITDL	Core 1: Digital Logic Design	4	2 1/2 Hours	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	Number System: Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code, Alphanumeric codes – ASCII Code, EBCDIC, ISCII Code, Hollerith Code, Morse Code, Teletypewriter (TTY), Error detection, and correction, Universal Product Code, Code conversion **Binary Arithmetic** Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess – 3 arithmetic
2	**UNIT 2**
	Boolean Algebra and Logic Gates: Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level. **Minterm, Maxterm and Karnaugh Maps:** Introduction, minterms and sum of minterm form, maxterm and Product

	of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5/6 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression, Quine Mc Cluskey Method.
3	**UNIT 3**
	Combinational Logic Circuits: Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations **Arithmetic Circuits:** Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator
4	**UNIT 4**
	Multiplexer, Demultiplexer, ALU, Encoder and Decoder: Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders. **Sequential Circuits: Flip-Flop:** Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flip-flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, conversion from one type of flip-flop to another, Application of flip-flops
5	**UNIT 5**
	Counters: Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, IC 7490, IC 7492, Synchronous counter ICs, Analysis of counter circuits. **Shift Register:** Introduction, parallel and shift registers, serial shifting, serial–in serial–out, serial–in parallel–out , parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, IC7495, Seven Segment displays, analysis of shift counters.

Reference Books
Digital Logic Design

Reference:

1. N. G. Palan. Digital Electronics and Logic Design, technova
2. Charles Platt, Make Electronics, O'Reilly, 1st Ed., 2010
3. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill, 3rd Ed.
4. Malvino and Leach, Digital principles and Applications, Tata McGraw Hill

Anil K. Maini, Digital Electronics: Principles, Devices and Applications, Wiley, 2007

Practical (1713UITPR)

1. Study of Logic gates and their ICs and universal gates:
   a) Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates
   b) IC 7400, 7402, 7404, 7408, 7432, 7486, 74266
   c) Implement AND, OR, NOT, XOR, XNOR using NAND gates.
   d) Implement AND, OR, NOT, XOR, XNOR using NOR gates.
2. Implement the given Boolean expressions using minimum number of gates.
   a) Verifying De Morgan's laws.
   b) Implement other given expressions using minimum number of gates.
   c) Implement other given expressions using minimum number of ICs
3. Implement combinational circuits.
   a) Design and implement combinational circuit based on the problem given and minimizing using K-maps
4. Implement code converters.
   a) Design and implement Binary – to – Gray code converter.
   b) Design and implement Gray – to – Binary code converter.
   c) Design and implement Binary – to – BCD code converter
   d) Design and implement Binary – to – XS-3 code converter
5. Implement Adder and Subtractor Arithmetic circuits.
   a) Design and implement Half adder and Full adder.
   b) Design and implement BCD adder.
   c) Design and implement XS – 3 adder.
   d) Design and implement binary subtractor.
   e) Design and implement BCD subtractor.
   f) Design and implement XS – 3 subtractor
6. Implement Arithmetic circuits
   a) Design and implement a 2-bit by 2-bit multiplier.
   b) Design and implement a 2-bit comparator.
7. Implement Encode and Decoder and Multiplexer and Demultiplexers
   a) Design and implement 8:3 encoder.
   b) Design and implement 3:8 decoder.
   c) Design and implement 4:1 multiplexer. Study of IC 74153, 74157
   d) Design and implement 1:4 demultiplexer. Study of IC 74139
   e) Implement the given expression using IC 74151 8:1 multiplexer.
   f) Implement the given expression using IC 74138 3:8 decoder
8. Study of flip-flops and counters
   a) Study of IC 7473.
   b) Study of IC 7474.
   c) Study of IC 7476.
   d) Conversion of Flip-flops.

e) Design of 3-bit synchronous counter using 7473 and required gates.
f) Design of 3-bit ripple counter using IC 7473

9. Study of counter ICs and designing Mod-N counters
   a) Study of IC 7490, 7492, 7493 and designing mod-n counters using these.
   b) Designing mod-n counters using IC 7473 and 7400 (NAND gates)
10. Design of shift registers and shift register counters.
   a) Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel – in parallel – out and bidirectional shift registers using IC 7474.
   b) Study of ID 7495.
   c) Implementation of digits using seven segment displays

Course Code	Course	Hrs. of Instruction/Week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1714UITOS	Core 2: Operating Systems	4	2 1/2 Hours	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	Introduction: What is an operating system? History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure. **Processes and Threads:** Processes, threads, interprocess communication, scheduling, IPC problems.
2	**UNIT 2**
	Memory Management: No memory abstraction, memory abstraction: address spaces, virtual memory, page replacement algorithms, design issues for paging systems, implementation issues, segmentation. **File Systems:** Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX V7 file system, CD ROM file system.
3	**UNIT 3**
	Input-Output: Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management, **Deadlocks:**

	Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues.
4	**UNIT 4**
	Virtualization and Cloud: History, requirements for virtualization, type 1 and 2 hypervisors, techniques for efficient virtualization, hypervisor microkernels, memory virtualization, I/O virtualization, Virtual appliances, virtual machines on multicore CPUs, Clouds. **Multiple Processor Systems** Multiprocessors, multicomputers, distributed systems.
5	**UNIT 5**
	Case Study on LINUX and ANDROID: History of Unix and Linux, Linux Overview, Processes in Linux, Memory management in Linux, I/O in Linux, Linux file system, security in Linux. Android **Case Study on Windows:** History of windows through Windows 10, programming windows, system structure, processes and threads in windows, memory management, caching in windows, I/O in windows, Windows NT file system, Windows power management, Security in windows.

Reference Books
Operating Systems
References: 1. Andrew S. Tanenbaum, Modern Operating Systems, Pearson, 4th Ed., 2014 2. William Stallings, Operating Systems- Internals and Design Principles, Pearson, 8th Ed., 2009 3. A. Silberschatz, Peter B Galvineg Gagne, Operating System Concepts, Wiley, 8th Ed. 4. Godbole and Kahate, Operating Systems, McGraw Hill, 3rd Ed.

Practical (1714UITPR)
1. Installation of virtual machine 2. Installation of Linux operating system (RedHat / Ubuntu) on virtual machine 3. Installation of Windows operating system on virtial machine 4. Linux commands: Working with Directories: a) pwd, cd, absolute and relative paths, ls, mkdir, rmdir b) file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod 5. Linux commands: Working with files: a) ps, top, kill, pkill, bg, fg b) grep, locate, find, locate c) date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which d) Compression: tar, gzip 6. Windows (DOS) Commands – 1 a) Date, time, prompt, md, cd, rd, path. b) Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move 7. Windows (DOS) Commands – 2 a) Diskcomp, diskcopy, diskpart, doskey, echo b) Edit, fc, find, rename, set, type, ver 8. Working with Windows Desktop and utilities a) Notepad b) Wordpad c) Paint d) Taskbar e) adjusting display resolution f) Using the browsers g) Configuring simple networking h) Creating users and shares 9. Working with Linux Desktop and utilities a) The vi editor. b) Graphics c) Terminal d) adjusting display resolution e) Using the browsers f) Configuring simple networking g) Creating users and shares h) 10. Installing utility software on Linux and Windows

Course Code:	Course	Hrs. of Instruction/ week	Exam Duration (Hours)	Maximum Marks			Credits
				CIE	SEE	Total	
1715UITDM	DSE 1: Discrete Mathematics	4	2 ½ hrs	25	75	100	3

Sr. No.	Modules / Units
1	**UNIT 1**
	Introduction: Variables, The Language of Sets, The Language of Relations and Function **Set Theory**: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras, Russell's Paradox and the Halting Problem. **The Logic of Compound Statements**: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments
2	**UNIT 2**
	Quantified Statements: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements **Elementary Number Theory and Methods of Proof**: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument: Contradiction and Contraposition, Two Classical Theorems, Applications in algorithms.
3	**UNIT 3**
	Sequences, Mathematical Induction, and Recursion: Sequences, Mathematical Induction, Strong Mathematical Induction and the Well-Ordering Principle for the Integers, Correctness of algorithms, defining sequences recursively, solving recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients. general recursive definitions and structural induction. **Functions**: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with

	Applications to Computability
4	**UNIT 4**
	Relations: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations **Graphs and Trees**: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest paths.
5	**UNIT 5**
	Counting and Probability: Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r-Combinations with Repetition Allowed, Probability Axioms and Expected Value, Conditional Probability, Bayes' Formula, and Independent Events.

Reference Books
Discrete Mathematics
References: 1. Sussana S. Epp, Discrete Mathematics with Applications, Cengage Learning, 4th Ed., 2010 2. Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Schaum's Outline Series, Tata McGraw Hill, 2007 3. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill 4. Kolman R. C., Bubsy, S. Ross, Discrete Mathematical Structures, PHI Liu, Discrete Structures, Tata McGraw Hill

Practical (1715UITPR)

1. Set Theory
   a) Inclusion Exclusion principle.
   b) Power Sets
   c) Mathematical Induction
2. Functions and Algorithms
   a) Recursively defined functions
   b) Cardinality
   c) Polynomial evaluation
   d) Greatest Common Divisor
3. Counting
   a) Sum rule principle
   b) Product rule principle
   c) Factorial
   d) Binomial coefficients
   e) Permutations
   f) Permutations with repetitions
   g) Combinations, Combinations with repetitions
   h) Ordered partitions
   i) Unordered partitions
4. Probability Theory
   a) Sample space and events
   b) Finite probability spaces
   c) Equiprobable spaces
   d) Addition Principle
   e) Conditional Probability
   f) Multiplication theorem for conditional probability
   g) Independent events
   h) Repeated trials with two outcomes
5. Graph Theory
   a) Paths and connectivity
   b) Minimum spanning tree
   c) Isomorphism
6. Directed Graphs
   a) Adjacency matrix
   b) Path matrix
7. Properties of integers
   a) Division algorithm
   b) Primes
   c) Euclidean algorithm
   d) Fundamental theorem of arithmetic
   e) Congruence relation
   f) Linear congruence equation
8. Algebraic Systems
   a) Properties of operations
   b) Roots of polynomials
9. Boolean Algebra
   a) Basic definitions in Boolean Algebra
   b) Boolean algebra as lattices
10. Recurrence relations
   a) Linear homogeneous recurrence relations with constant coefficients
   b) Solving linear homogeneous recurrence relations with constant coefficients
   c) Solving general homogeneous linear recurrence relations

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
Q.1	Unit 1	15
Q.2	Unit 2	15
Q.3	Unit 3	15
Q.4	Unit 4	15
Q.5	Unit 5	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d & e, etc & the allocation of Marks depends on the weightage of the topic.

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 Exam)