B.TECH. COMPUTER SCIENCE & ENGINEERING SYLLABUS 2018 BATCH ONWARDS (UPDATE ON 24.05.2019)

(3rd SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BMATH1-301	Calculus and Ordinary Differential Equation	3	0	0	40	60	100	3
BCSES1-301	Computer Peripherals & Interfaces	3	0	0	40	60	100	3
BCSES1-302	Data structure &Algorithms	3	1	0	40	60	100	4
BCSES1-303	Digital Electronics	3	1	0	40	60	100	4
BCSES1-304	Data structure & Algorithms Laboratory	0	0	4	60	40	100	2
BCSES1-305	Digital Electronics Laboratory	0	0	2	60	40	100	1
BCSES1-306	IT Workshop (SciLab / MATLAB) Laboratory	0	0	4	60	40	100	2
BCSES1-307	Training-I*	-	-	-	60	40	100	3
BHSMC0-007	Development of Societies	3	0	0	40	60	100	3
Total 5 Theory &3 Lab. Courses		**15**	**2**	**10**	**440**	**460**	**900**	**25**

*NOTE: Training after the 2nd Semester.

(4th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BMATH1-401	Discrete Mathematics	3	1	0	40	60	100	4
BCSES1-401	Computer Organization &Architecture	3	0	0	40	60	100	3
BCSES1-402	Operating Systems	3	1	0	40	60	100	4
BCSES1-403	Object Oriented Programming	3	1	0	40	60	100	4
BCSES1-404	Operating Systems Laboratory	0	0	2	60	40	100	1
BCSES1-405	Object Oriented Programming Laboratory	0	0	4	60	40	100	2
BHSMC0-016	Organizational Behaviour	3	0	0	40	60	100	3
Total 5 Theory & 2 Lab. Courses		**15**	**3**	**06**	**320**	**380**	**700**	**21**

B.TECH. COMPUTER SCIENCE & ENGINEERING SYLLABUS 2018 BATCH ONWARDS (UPDATE ON 24.05.2019)

(5th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-501	Compiler Design	3	1	0	40	60	100	4
BCSES1-502	Database Management System	3	0	0	40	60	100	3
BCSES1-503	Formal Language and Automata Theory	3	0	0	40	60	100	3
BCSES1-504	Design &Analysis of Algorithms	3	1	0	40	60	100	4
BCSES1-505	Database Management System Laboratory	0	0	4	60	40	100	2
BCSES1-506	Design &Analysis of Algorithms Laboratory	0	0	2	60	40	100	1
BCSES1-507	Training-II*	-	-	-	60	40	100	4
	Departmental Elective-I	3	0	0	40	60	100	3
BCSED1-511	Computer Graphics							
BCSED1-512	Graph Theory							
BCSED1-513	Web Technologies							
BCSED1-514	Java Programming							
BHSCM0-015	Finance & Accounting	3	0	0	40	60	100	3
Total 7 Theory & 2 Lab. Courses		-	-	-	420	480	900	27

*NOTE: During the summer vacation after 4th.

(6th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-601	Software Engineering	3	0	0	40	60	100	3
BCSES1-602	Computer Networks	3	1	0	40	60	100	4
BCSES1-603	Computer Network Laboratory	0	0	2	60	40	100	1
BCSES1-604	***Project-I	0	0	4	60	40	100	2
	Departmental Elective-II (Select any One)	3	0	0	40	60	100	3
BCSED1-611	Mobile Application Development							
BCSED1-612	Machine Learning							
BCSED1-613	Distributed Systems							
BCSED1-614	Signals and Systems							
	Departmental Elective-II (Select any One)	3	0	0	60	40	100	3
BCSED1-621	Data Mining							
BCSED1-622	Cloud Computing							
BCSED1-623	Parallel Processing							
BCSED1-624	Embedded Systems							
XXXX	**Open Elective****	3	0	0	40	60	100	3
Total 5 Theory &2 Lab. Courses		-	-	-	340	360	700	19

** Open Elective Subject may be chosen from the list of open elective offered by other departments of university

***Project work, seminar and internship in industry or at appropriate work place

(7ᵗʰSEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	L	T	P	Int.	Ext.	Total	
BCSES1-701	*Project-II	0	0	4	60	40	100	2
BCSES1-702	***Training-III	-	-	-	60	40	100	4
	Departmental Elective-IV	3	0	0	40	60	100	3
BCSED1-711	Distributed Operating System							
BCSCD1712	Soft Computing							
BCSCD1-713	Human Computer Interaction							
BCSCD1-714	Ad-hoc & Sensor Networks							
	Departmental Elective-V	3	0	0	40	60	100	3
BCSED1-721	Bioinformatics							
BCSED1-722	Image processing							
BCSED1-723	Cryptography & Network Security							
BCSED1-724	Artificial Intelligence							
XXXX	**Open Elective***	3	0	0	40	60	100	3
BMNCC0-002	Environmental Sciences	2	0	0	40	00	40	0
Total 4 Theory &1 Lab. Courses		-	-	-	280	260	540	15

***Open Elective Subject may be chosen from the list of open elective offered by other departments of university

****Continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place

*****During the summer vacation after 6th semester.

(8ᵗʰ SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	L	T	P	Int.	Ext.	Total	
BCSES1-801	Project-III**	0	0	10	60	40	100	5
	Departmental Elective-VI	3	0	0	40	60	100	3
BCSED1-811	Enterprise Resource Planning							
BCSED1-812	Internet of things							
BCSED1-813	Advanced Database Management Systems							
BCSED1-814	Software Project Management							
XXXX	**Open Elective***	3	0	0	40	60	100	3
XXXX	**Open Elective***	3	0	0	40	60	100	3
	Mandatory Courses- non credit***	2	0	0	40	00	40	0
BMNCC0-001	Constitution of India							
BMNCC0-006	Essence of Indian Knowledge Tradition							
Total 4 Theory &1 Lab. Courses		-	-	-	220	220	440	14

*Open Elective Subject may be chosen from the list of open elective offered by other departments of university

**Project III to be made by student during the semester.

***choose any one subject from mandatory Courses.

Calculus and Ordinary Differential Equation

Subject Code- BMATH1- 301   **L T P C**   **Duration – 45hrs**
                                        3 0 0 3

COURSE OBJECTIVE

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

COURSE OUTCOME

CO1 To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.

CO2 The essential tools of matrices and linear algebra including linear transformations, eigenvalues, diagonalization and orthogonalization.

COURSE CONTENT

UNIT-I (12hrs)

Sequences and Series: Basic concept of Convergence, tests for convergence, power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions.

Multivariable Calculus: Partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

UNIT-II (11 hrs)

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables, Theorems of Green, Gauss and Stokes (without proof), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT-III(11 hrs)

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-IV (11 hrs)

Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

RECOMMENDED BOOKS

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
6. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
7. Earl A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

COMPUTER PERIPHERALS & INTERFACES

Subject Code- BCSES1-301   **L T P C**   **M Duration – 45 hrs.**
                                    3 0 0 3

COURSE OBJECTIVCE

To learn the functional and operational details of various peripheral devices.

COURSE CONTENT

UNIT I(12hrs)

SYSTEM RESOURCES: Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus.

IDE & SCSI Interfaces: IDE origin, IDE Interface ATA standards. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation, SATA, SSD drives.

UNIT II(11hrs)

Video Hardware: Video display technologies, DVI Digital signals for CRT Monitor, LCD, LED, OLED Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM,Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies,TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers.

UNIT III(11hrs)

I/O Interfaces: I/O Interfaces from USB1.0, 2.0, 3.0, lighting port, I/O Interface from serial, Parallel to SCSI converter. Testing of serial andparallel port, USB Mouse/ Keyboard Interfaces like HDMI

Input/ Output Driver software aspects: Role of device driver DOS and UNIX/ LINUX device drivers.

UNIT IV(11hrs)

Design & Integration of Peripheral devices to a computer system as a Case Study

Future Trends: Detailed Analysis of recent Progress in the Peripheral devices. Some aspects of cost Performance analysis and applications of latest digital devices like WiFi-LED projectors, HDMI devices, wireless printers and other devices

RECOMMENDED BOOKS

1. Douglas V. Hall,"Microprocessors and Interfacing", Tata McGraw Hill 2006.
2. Barry B. Brey&C.R.Sarma, "The intel microprocessors," Pearson 2003.
3. P. Pal Chandhari, "Computer Organization and design" Prentice Hall of India Pvt. Ltd, 1994.
4. Del Corso, H.Kirrman, JD Nicond "Microcomputer buses & links" Academic Press 1986.

DATA STRUCTURE & ALGORITHMS

Subject Code- BCSES1-302	L T P C	Duration – 60hrs
	3 1 0 4	

COURSE OBJECTIVE

1. To impart the basic concepts of data structures and algorithms
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Basic Terminologies: Elementary Data Organizations, Data StructureOperations: insertion, deletion, traversal etc.; Analysis of an Algorithm, AsymptoticNotations, Time-Space trade off. Searching: Linear Search and Binary Search Techniquesand their complexity analysis.

UNIT-II (15hrs)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexityanalysis, Applications of Stacks: Expression Conversion and evaluation –corresponding algorithms and complexity analysis. ADT queue, Types of Queue: SimpleQueue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithmsand their analysis.

UNIT-III (15hrs)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of severaloperations: Traversing, Searching, Insertion into, Deletion from linked list; Linkedrepresentation of Stack and Queue, Header nodes, Doubly linked list: operations on it andalgorithmic analysis; Circular Linked Lists: all operations their algorithms and thecomplexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search trees, Binary Search Tree,Tree operations on each of the trees and theiralgorithms with complexity analysis. Introduction to B Tree, B+ Tree and AVL Tree

UNIT-IV (15hrs)

Sorting and Hashing: Objective and properties of different sorting algorithms:Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort;Performance and comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and

complexity analysis.

RECOMMENDED BOOKS:
1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni, Computer Science Press.

SUGGESTED REFERENCE BOOKS:
2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition byMark Allen Weiss, Addison-Wesley Publishing Company
3. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

COURSE OUTCOMES
CO1 For a given algorithm student will able to analyze the algorithms to determine the timeand computation complexity and justify the correctness.
CO2 For a given Search problem (Linear Search and Binary Search) student will able toimplement it.
CO3 For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
CO4 Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort,Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Spaceand Time complexity.
CO5 Student will able to implement Graph search and traversal algorithms and determinethe time and computation complexity.

DIGITAL ELECTRONICS

Subject Code- BCSES1-303   **L T P C**   **Duration – 60hrs**
                                     3 1 0 4

COURSE OBJECTIVE
To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

COURSE OUTCOMES
At the end of this course, students will demonstrate the ability to
CO1 Understand working of logic families and logic gates.
CO2 Design and implement Combinational and Sequential logiccircuits.
CO3 Understand the process of Analog to Digital conversion and Digital to Analog conversion.
CO4 Be able to use PLDs to implement the given logical problem.

COURSE CONTENT
UNIT-I (15hrs)
Fundamentals of Digital Systems and logicfamilies: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations,Boolean algebra, examples ofICgates, number systems-binary, signed binary, octal hexadecimalnumber, binaryarithmetic,one's and two's complements arithmetic, codes, error detecting andcorrectingcodes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOSlogic, interfacing CMOS and TTL, Tri-statelogic.

Combinational DigitalCircuits: Standard representation for logic functions, K-map representation, simplification oflogicfunctionsusing K-map, minimization of logical

functions. Don't care conditions, Multiplexer,De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder,serialadder,ALU, elementary ALU design, popular MSI chips, digital comparator,paritychecker/generator, codeconverters, priority encoders, decoders/drivers for display devices,Q-M method offunctionrealization.

UNIT-II (15hrs)

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallelconverter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-III (15hrs)

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter,specificationsfor D/A converters, examples of D/A converter lCs, sample and hold circuit,analog to digitalconverters: quantization and encoding, parallel comparator A/Dconverter,successive approximationA/D converter, counting A/D converter, dual slope A/Dconverter,A/DconverterusingVoltagetofrequencyandvoltagetotimeconversion,specificationsofA/Dconverters, example of A/DconverterICs

UNIT-IV (15hrs)

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification andcharacteristicsofmemories, sequential memory, read only memory (ROM), read and write memory(RAM), contentaddressable memory (CAM), charge de coupled device memory (CCD), commonly used memorychips, ROM as a PLD, Programmable logic array, Programmable array logic, complexProgrammable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

RECOMMENDED BOOKS

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

DATA STRUCTURE & ALGORITHMS LABORATORY

Subject Code- BCSES1-304   **L T P C**
                                             0 0 4 2

COURSE OUTCOMES

CO1 To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.

CO2 To introduce the structured data types like Stacks and Queue and its basic operation's implementation

CO3 To introduces dynamic implementation of linked list

CO4 To introduce the concepts of Tree and graph and implementation of traversal algorithms.

PRACTICALS

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1. Write a program for Linear search methods.
2. Write a program for Binary search methods.
3. Write a program for insertion sort, selection sort and bubble sort.
4. Write a program to implement Stack and its operation.
5. Write a program for quick sort.
6. Write a program for merge sort.
7. Write a program to implement Queue and its operation.
8. Write a program to implement Circular Queue and its operation.
9. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
10. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.

DIGITAL ELECTRONICS LABORATORY

Subject Code- BCSES1-305 **L T P C**
                               0 0 2 1

COURSE OUTCOMES
CO1 To Familiarization with Digital Trainer Kit and associated equipment.
CO2 To Study and design of TTL gates
CO3 To learn the formal procedures for the analysis and design of combinational circuits.
CO4 To learn the formal procedures for the analysis and design of sequential circuits
PRACTICALS: Implementation all experiments with help of Bread- Board.
1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates. 13 13 Punjab Technical University B.Tech. Computer Science Engineering (CSE)
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

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IT WORKSHOP (SciLab / MATLAB) LABORATORY

Subject Code- BCSES1-306 **L T P C**
  0 0 4 2

Following experiments to be conducted using Sci Labs / MATLAB
1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. Use of help command to get help about different inbuilt functions.
3. Write a program to show the output of various unary and binary operators.
4. Write programs for Matrix Manipulations, (reshaping matrices, expanding matrix size, appending or deleting a row/column to a matrix, concatenation of matrices).
5. Write programs which demonstrate the use special matrices.
6. Write programs to show output for various matrix and array operations.
7. Write programs for demonstrating the use for various control statements.
8. Write a MATLAB code for computing factorial of a number n. Assume n is already defined. The code should return a scalar, not a vector.
9. Write programs using functions and plot results.
*other programs related to some application area may also be done

TRAINING-1

Subject Code- BCSES1-307 **L T P C**   **Duration – 4 WEEKS**
  0 0 0 3

Training after the 2nd Semester, students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective institutions; contribution at incubation/ innovation /entrepreneurship cell of the institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the institutes and Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/Design/ Innovation/ Business Completion/ Technical Expos etc.

DEVELOPMENT OF SOCIETIES

Subject Code- BHSMC0-007 **L T P C**   **Duration – 45hrs**
  3 0 0 3

COURSE OBJECTIVE:
This is one of the foundation courses of Humanities (in Foundation Area 1). It is envisaged that this course will provide a natural link between engineering and humanities with an emphasis that Development is not just materialistic, larger view of all round human development should also be considered. Importance of sustainable development, inter-dependence and co-existence in nature should be realised through this course. It is to gain an understanding of alternative models of development.

UNIT-I (15hrs)

Social Development: Concepts behind the origin of Family, Clan and Society, Different Social Systems, Relation between Human being and Society, Comparative studies on different models of Social Structures and their evolution

UNIT-II (15hrs)

Political Development: Ideas of Political Systems as learnt from History, Different models of Governing system and their comparative study

UNIT-III(15hrs)

Economic Development: Birth of Capitalism, Socialism, Marxism, Concept of development in pre-British, British and post British period- Barter, Jajmani, Idea of development in current context., E. F. Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.

RECOMMENDED BOOKS:

3.1 TEXTBOOK:
1. 'Indian Society' by Dr S.K Jena & B.N Mohanty
2. 'Indian Society' by C.N Shankar Rao
3. 'Foundations of Political Science, Indian Constitution & Government' by Gulshan Rai, SomNathVerma& Suresh Kumar

3.2 *REFERENCE BOOKS:
1. 'The Interpretation of Cultures: Selected Essays' by Geertz & Clifford. 1973, New York
2. 'Dictionary of Modern Sociology Hoult' by Thomas Ford, ed. 1969) Totowa, New Jersey, United States: Littlefield, Adams & Co.
3. 'Sociology –In a Changing Society' by William Korblum
4. 'The Origin of Humankind' by Leakey, Richard 1996, New York Basic Books

4. OTHER SESSIONS
4.1 *TUTORIALS:
4.2 *LABORATORY:
4.3 *PROJECT: Possible projects in this course could be
a) Interact with local communities and understand their issues.
b) Study local cottage industry and agricultural practices. Role of engineering and specialized knowledge.
c) Evaluation of technology in the context of its application. Social impact of technology. Environmental impact of technology. Evaluation from a holistic perspective.

DISCRETE MATHEMATICS

Subject Code- BMATH1-401   **L T P C**   **Duration – 60 hrs.**
                                  3 1 0 4

COURSE OBJECTIVE

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. Apply logical reasoning to solve a variety of problems.

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

CO1 For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

CO2 For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference

CO3 For a given a mathematical problem, classify its algebraic structure

CO4 Evaluate Boolean functions and simplify expressions using the properties of Boolean Algebra

CO5 Develop the given problem as graph networks and solve with techniques of graph theory**.**

COURSE CONTENTS

UNIT-I (15 hrs)

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-II (15 hrs)

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and

Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT-III (15 hrs)

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra

and Boolean Ring, Identities of Boolean Algebra, Duality,Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT-IV (15 hrs)

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle,Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring mapsand Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph,definition properties and Example, rooted trees, trees and sorting, weighted trees andprefix codes, Bi-connected component and Articulation Points, Shortest distances.

RECOMMENDED BOOKS:
1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, WadsworthPublishing Co. Inc.
3. Satinder Bal Gupta, Discrete Mathematics and structures, University Science Press, New Delhi.
4. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

SUGGESTED REFERENCE BOOKS:
1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application toComputer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code- BCSES1-401   **L T P C**   **Duration – 45hrs**
                                                          3 0 0 3

COURSE OBJECTIVE

To expose the students to the following:
1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

COURSE CONTENT

UNIT-I (11 hrs)

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit.Instruction set architecture of a CPU–registers, instruction execution cycle, RTLinterpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating pointrepresentations, character representation. Computer arithmetic – integer addition andsubtraction, ripple carry adder, carry look ahead adder etc. multiplication shift and add.

UNIT-II (12 hrs)

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches.
Memory system design: semiconductor memory technologies, memory organization.

UNIT-III (11 hrs)
Peripheral devices and their characteristics: Input-output subsystems, I/O deviceinterface, I/O transfers–program controlled, interrupt driven and DMA, software interrupts and exceptions. Programs andprocesses–role of interrupts in process state transitions.

UNIT-IV (11 hrs)
Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.
Parallel Processors: Introduction to parallel processors.
Memory organization: Memory interleaving, concept of hierarchical memory organization,cache memory, cache size vs. block size, mapping,replacement algorithms.

RECOMMENDED BOOKS:
1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

SUGGESTED REFERENCE BOOKS:
1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

COURSE OUTCOMES
CO1 Draw the functional block diagram of a single bus architecture of a computer anddescribe the function of the instruction execution cycle, RTL interpretation ofinstructions, addressing modes, instruction set.

CO2 Write assembly language program for specified microprocessor for computing16 bit multiplication, division and I/O device interface (ADC, Control circuit, serialport communication).

CO3 Write a flowchart for Concurrent access to memory and cache coherency in ParallelProcessors and describe the process.

CO4 Given a CPU organization and instruction, design a memory module and analyze itsoperation by interfacing with the CPU.

CO5 Given a CPU organization, assess its performance, and apply design techniques toenhance performance using pipelining, parallelism and RISC methodology

OPERATING SYSTEMS

Subject Code- BCSES1-402	**L T P C**		Duration – 60hrs
	3 1 0 4		

COURSE OBJECTIVE

To learn the fundamentals of Operating Systems.

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
4. To know the components and management aspects of concurrency management
5. To learn to implement simple OS mechanisms

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

CO1 Create processes and threads.

CO2 Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.

CO3 For a given specification of memory organization develop the techniques foroptimally allocating memory to processes by increasing memory utilization andfor improving the access time.

CO4 Design and implement file management system and For a given I/O devices and OS (specify) develop the I/O management functions in OSas part of a uniform device abstraction by performing operations for synchronizationbetween CPU and I/O controllers.

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Concept of Operating Systems, Generations of Operating systems, Typesof Operating Systems, OS Services, System Calls, Structure of an OS-Layered,Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study onUNIX and WINDOWS Operating System.

UNIT-II (16hrs)

Processes: Definition, Process Relationship, Different states of a Process, Process Statetransitions, Process Control Block (PCB), Context switching

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, **Scheduling criteria:** CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessorscheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT-III (15hrs)

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, DeadlockPrevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memoryallocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation -Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging,Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC),Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV (14hrs)

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked,indexed), Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Diskreliability, Disk formatting, Boot-block, Bad blocks

RECOMMENDED BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

SUGGESTED REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

OBJECT ORIENTED PROGRAMMING

Subject Code- BCSES1-403	L T P C	Duration – 60 hrs
	3 1 0 4	

COURSE OBJECTIVE

To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System

COURSE OUTCOME

CO1 To introduce the basic concepts of object oriented programming language and its representation

CO2 To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.

CO3 To introduce polymorphism, interface design and overloading of operator.

CO4 To handle backup system using file, general purpose template and handling of raised exception during programming

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COURSE CONTENT
UNIT-I (15hrs)

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

UNIT-II (15hrs)

This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors,

Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in a Derived Class, Public, Protected and Private Inheritance

UNIT-III (15hrs)

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <<,>> Unary Operators, Binary Operators.

Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception.

UNIT-IV (15hrs)

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates

Introduction: design patterns, Classifications

Introduction: model- view- controller pattern

RECOMMENDED BOOKS:

4. Robert Lafore, 'Object Oriented Programming in Turbo C++',2nd Ed., The WAITE Group Press, **1994**.
5. Herbert shield, 'The complete reference C ++', 4th Ed., Tata McGraw Hill, **2003**.
6. Shukla, 'Object Oriented Programming in C++', Wiley India, 2008.
7. H M Deitel and P J Deitel, 'C++ How to Program',2nd Ed., Prentice Hall, **1998**.
8. D Ravichandran, 'Programming with C++', 3rd Ed., Tata McGraw Hill, **2003**.
9. Bjarne Stroustrup, 'The C++ Programming Language',4th Ed.,Addison Wesley,**2013**.
10. R. S. Salaria, 'Mastering Object-Oriented Programming with C++', Salaria Publishing House, **2016**.

OPERATING SYSTEMS LABORATORY

Subject Code- -BCSES1-404   **L T P C**
                                      0 0 2 1

1. Installation Process of various operating systems
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine
3. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing

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multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.

4. Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case statements, parameter passing and arguments, shellvariables, shell keywords, creating shell programs for automate system tasks, report printing.

OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY

Subject Code- BCSES1-405 **L T P C**
 0 0 4 2

PRACTICALS

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors.
6. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
7. Initializer Lists- Write a program to demonstrate the use of initializer list.
8. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
9. Operator Overloading- Write a program to demonstrate the overloading of binary arithmetic operators.
10. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
11. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
12. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
13. Inheritance- Write a program to demonstrate the multilevel inheritance

ORGANIZATIONAL BEHAVIOR

Subject Code- BHSMC0-016 **L T P C** **Duration – 45hrs**
 3 0 0 3

Course Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global scenario. The course must be taught using case study method.

UNIT-I (12Hrs)

Organizational Behaviour: Concepts, Theories and organization aspects of OB, Contributing Disciplines to OB, challenges and opportunities for OB. Foundations of Individual Behaviour: Biographical Characteristics, Course, Theories of Course, Attitudes,

Attitude Change, Values & Believes, Prejudices Personality: Determinants of Personality, Perception, Attribution Theory, Person's Perception.

UNIT-II (11Hrs)

Motivation: Definition & Process, Early Theories of Motivation, Contemporary Theories of Motivation, Nature and process of Motivation, Application of Motivation Concept. Job Satisfaction: Nature & Significance of Job satisfaction. Leadership: Nature Significance & Theories; Leadership Effectiveness Model; Leadership Traits & Skills; Behavioural Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model.

UNIT-III (11Hrs)

Foundations of Group Behaviour: Nature & Concept of Group Formation, Stages of Group Formation, Theories of Group Formation. Teams, Difference between Group and Team Group Decision Making: Meaning & Nature, Decision Making Process; Decision Making Styles; Advantages & disadvantages of Decision Making; Techniques of Decision Making; Group Size & Decision Making.

UNIT-IV (11Hrs)

Organizational Change & Development: Meaning & Definition, Change Agents, Change Models, Resistance to Change. Power and Politics in Organization: Nature & Concepts, Sources & Types of Power, Techniques of Politics. Stress Management: Meaning and Concept of Stress, Stress in Organizations

Recommended Books

1. Robbins, 'Organization Behavior', Pearson Education.
2. Luthans, Organization Behavior', Tata McGraw Hill.
3. Hersey, 'Management of Organizational Behavior', Prentice Hall India.
4. Aswathappa, 'Organization Behavior', Himalaya Publications.
5. L.M. Prasad, 'Organization Behavior', Sultan Chand & Sons
6. Parikh, Gupta, 'Organizational Behavior', Tata McGraw Hill