



Karmaveer Bhaurao Patil University, Satara

Syllabus for

B. Sc. I Computer Science (Entire)

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2024-2025

Preamble:

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector.

Computer science graduates pass out find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on.

They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multi-media equipment, or working in teams for product development.

The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

General Objectives of the Programme:

1. To nurture academicians with focus and commitment to their subject.
2. To shape good and informed citizens from the students entering into the Programme.
3. To create a skilled workforce to match the requirements of the society.
4. To impart knowledge of Science is the basic objective of this Programme.
5. To develop scientific attitude is the major objective so as to make the students open minded, critical and curious.
6. To develop skill in practical work, experiments and laboratory materials and equipments along with the collection and interpretation of scientific data to contribute to science.

Programme Outcomes:

1. The students will graduate with proficiency in the subject of their choice.
2. The students will be eligible to continue higher studies in their subject.
3. The students will be eligible to pursue higher studies abroad.
4. The students will be eligible to appear for the examinations for jobs in government organizations.
5. The students will be eligible to apply for jobs with a minimum requirement of B.Sc. Programme.

Program Specific Objectives of the Course:

1. The content of the syllabus have been framed as per UGC norms of CBCS Pattern.
2. The students are expected to understand the fundamentals, principles, mathematical, recent IT concepts and recent developments in the subject area.
3. The practical course is in relevance to the theory courses to improve the understanding of the concepts.
4. It is expected to inspire and boost interest of the students towards Computer Science as the main subject.
5. To develop the power of appreciations, the achievements in Computer and role in nature and society.
6. To enhance student sense of enthusiasm towards IT and to involve them in an intellectually stimulating experience of learning in a supportive environment.

Program Specific Outcomes:

After successful completion of B.Sc. Computer Science (Entire) Course student will be able to:

1. Explain the basics of Computer Science.
2. Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.
3. Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Computer Science.
4. Identify their area of interest in academic, research and development.
5. Perform job in various fields' like IT, science, engineering, education, banking, business and public service, etc. or be an entrepreneur with precision, analytical mind, innovative thinking, clarity of thought, expression, and systematic approach.

B.Sc. I SEM - I Computer Science (Entire)

1	Course-I	DSC -I	BCSET 111	C Programming-I
2		DSC-II	BCSET 112	DBMS
3		DSCP- I	BCSEP 113	Lab I Based on BCSET 111 and BCSET 112
4	Course-II	DSC -I	BCSET 114	Computational Mathematics I
5		DSC-II	BCSET 115	Computational Statistics I
6		DSCP- I	BCSEP 116	Lab II Based on BCSET 115 and BCSET 116
7	Course-III	DSC -I	BCSET 117	Computational Electronics I
8		DSC-II	BCSET 118	Computational Electronics II
9		DSCP- I	BCSEP 119	Lab III Based on BCSET 117 and BCSET 118
10		OE	BCSETOE I	Defence Studies
11		IKS	BCSETIKS I	

B.Sc. I SEM - II Computer Science (Entire)

1	Course-I	DSC -I	BCSET 121	C Programming-II
2		DSC-II	BCSET 122	RDBMS
3		DSCP- I	BCSEP 123	Lab I Based on BCSET 121 and BCSET 122
4	Course-II	DSC -I	BCSET 124	Computational Mathematics II
5		DSC-II	BCSET 125	Computational Statistics II
6		DSCP- I	BCSEP 126	Lab II Based on BCSET 124 and BCSET 125
7	Course-III	DSC -I	BCSET 127	Computational Electronics III
8		DSC-II	BCSET 128	Computational Electronics IV
9		DSCP- I	BCSEP 129	Lab III Based on BCSET 127 and BCSET 128
10		OE	BCSETOE II	Defence Studies
11		CC	BCSETCC I	DEGG & IIC

B.Sc. Part I: Computer Science (Entire)

SEMESTER-I**Theory Course I: BCSET 111: C Programming - I**

Course Objectives: - Student should be able to ...

1. learn a Programming logic concept.
2. understand the basic principles of programming.
3. discover skills for writing programs using 'C.'
4. study skill of Control structure and function concepts using 'C'

Credits=2	SEMESTER-I BCSET 111: C Programming – I	No. of hours per unit (30)
UNIT I	Introduction to 'C'	(7)
	Basics of Linux Operating System (Ubuntu) and 'C' programming Language in Linux; History of 'C' ; Characteristics of C Language; Algorithm; Flowcharts- (Definition, Symbol, features); Character set and keywords; Structure of 'C' programming; Constant and its type; Compiling and debugging the program; Introduction of C Compiler-GCC Compiler; Vim Editor.	
UNIT II	Input-Output Statements	(8)
	Variable and its Data types in 'C'; Operators- Arithmetic, logical, relational, bitwise, increment, decrement, conditional, operator precedence; Formatted input-output - printf(), scanf(); Character input-output – getch(), getche(), getchar(), putchar() ; String input-output - gets(), puts();	
UNIT III	Control Structures	(7)
	Conditional control statements- if, if else, nested if, else if ladder; switch Looping – for statements, nested for, while, do-while statements, nested while and do while, Infinite loop; Unconditional breaking control statements- break, continue, goto;	
UNIT IV	Functions	(8)
	Definition; Declaration; prototype of function; Local and global variable; User defined Functions; Recursion; Call by value and Call by reference; Preprocessor; Macros. String functions (strcpy(), strcmp(), strcat(), strlen(), strrev());	

Course Outcomes: - Student will be able to ...

1. illustrate the flowchart and design an algorithm for a given problem and to develop solution
2. develop conditional and unconditional statements to write C program.
3. exercise user defined functions to solve real time problems.

Reference Books: –

- 1) Yashavant Kanetkar , Let Us C: Authentic guide to C programming language india, 2022.
- 2)Yashavant Kanetkar let us C bpb publications india, 2021.
- 3) E-Balagurusamy PROGRAMMING IN ANSI C McGraw Hill Education Private Limited 2019.
- 4) Peter Prinz , C in a Nutshell O'Reilly Media, Inc 2015.
- 5) Stephen G. Kochan, Programming in C Upper Saddle River, NJ Pearson 2014.
- 6) Greg Perry , C programming Absolute Beginner's Guide Pearson Education India, 2014.
- 7) David Griffiths ,Head First C Shroff Publishers & Distributors Pvt. Ltd, 2012.
- 8) K.N. King , C Programming: A Modern Approach Georgia State University, 2008.

Theory Course II: BCSET 112: Database Management System

Course Objectives: - Student should be able to...

1. study the concepts and terminologies of DBMS
2. explain the concept of Normalization concepts
3. understand ER-Model
4. Observe the different database systems.

Credits=2	SEMESTER-I BCSET 112: Database Management System	No. of hours per unit (30)
UNIT I	Organization of Database System	(8)
	Introduction of file; file types; organization of file- heap file organization; serial file organization; sequential; index sequential file; random access file (direct access file); Definition of Database; Needs; features Database Management Systems (DBMS): Definition, components, comparison of file processing system with DBMS.	
UNIT II	Database concepts	(7)
	Types of Database System: centralized database system; client-server system; distributed database system; Functions of DBMS; advantages; disadvantages of DBMS; Structure of DBMS; Services provided by DBMS; schema; subschema; data abstraction; data independence; architecture of database system; data dictionary; database administration; database manager.	
UNIT III	Data Models	(7)
	Introduction; definition; features of data models; Object based data models- Entity Relationship Model; cardinality; Record based models- Relational Model; Network Model; Hierarchical Model; Physical Data Models Keys: Primary key; foreign key; candidate key; super key; unique key Normalization: Concept of normalization; advantages; First NF; Second NF; Third NF; examples of normalizations.	
UNIT IV	Conceptual Design (E-R model)	(8)
	Overview of DB design; ER data model (entities, attributes, entity sets, relations, relationship sets); Additional constraints (key constraints; participation constraints; weak entities; aggregation / generalization; Conceptual design for small to large enterprises; Case Study: Design Database System for- Library management system; Bank management system; Inventory management system.	

Course Outcomes: - Student will be able to ...

1. improve skill about data operation.
2. interpret to handle database.
3. design& develop proper database.
4. ability to design ER-Model on Case study

Reference Books:

1. An Introduction to Database Systems Christopher J. Date, 1975
- 2 Database Systems: The Complete Book Jeffrey Ullman, 2001
3. Foundations database Serge Abiteboul, 1995
4. Access 2016 Bible Michael Alexander, 2015

Lab Course I: BCSEP 113: Based on BCSET 111 and BCSET 112

(C Programming – I and Database Management System)

Course Objectives: Student should be able to...

1. understand programming and its roles in problem solving
2. learn programming skills using the fundamentals and basics of C Language.
3. study the concepts and terminologies of DBMS
4. describe the ER-Model

Credits=2	SEMESTER-I BCSEP 113: Lab I- C Programming – I and Database Management System	No. of hours per unit (60)
Group A	C Programming – I	
	<ol style="list-style-type: none"> 1. Write a program on arithmetic operator 2. Write a Program to convert the Temperature in centigrade degree to the Fahrenheit degree. 3. Write a program to demonstrate whether given number is even or odd. 4. Write a program to find out First Fifty Prime numbers. 5. Write a program to display Fibonacci series. 6. Write a program to reverse the given number. 7. Write a program which display following output- A B C D E A B C D A B C A B A 8. Write a program for string functions 9. Write a program to calculate area of circle using function 10. Write a program calculate sum of two number using macro 11. Write a program to use of call by value and call by reference 12. Write a program to read single character (getchar()) 	
Group B	Database Management System	
	<ol style="list-style-type: none"> 1. Create Employee master and Employee detailed table with appropriate field to apply following constraint on field. <ol style="list-style-type: none"> a. Primary Key b. Foreign Key c. Not null key d. default key e. Check constraint etc. 2. Create student table with appropriate field and do. <ol style="list-style-type: none"> a. Insert 5 appropriate records b. Update city as Mumbai whose Roll No is 2. c. Delete record Who live in Satara 3. Create Bank table with appropriate field and do. <ol style="list-style-type: none"> a. Insert 5 appropriate records b. Increment salary by 5000 whose EmpId id 101. c. Delete record Who Work in Satara City 	

	<ol style="list-style-type: none">4. Create Hospital table with appropriate field and do.<ol style="list-style-type: none">a. Insert 5 appropriate recordsb. Change the size of Patient Name by 50 Char.c. Delete Column name DOB.d. Drop Table.5. Case Study on Library System.	
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Course Outcomes: - Student will be able to ...

1. exercise different Operators.
2. analyze basic Structure of the C-PROGRAMMING, declaration and usage of variables.
3. ability to design& develop proper database.
4. design ER-Model on Case study

Reference Books:

- 1.Let Us C – Yashwant Kanetkar, BPB Publications, 18th Edition 25 Nov 2021
- 2.The C Programming Language by Brian Kernighan and Dennis Ritchie 1978
- 3.C: The Complete Reference. By Herbert Schildt 1987
- 4FOUNDATIONS database Serge Abiteboul, 1995
- 5.Access 2016 Bible Michael Alexander, 2015

BCSET 114: Computational Mathematics I

Course Objectives: - Student should be able to ...

1. understand number system and their inter conversion.
2. learn concept of Lattice & Boolean algebra
3. describe the concept of graph & algorithms and tree graph
4. study the concept of directed graph, Network and flow.

Credits=2	SEMESTER-I BCSET 114: Computational Mathematics I	No. of hours per unit (30)
UNIT I	Number system	(6)
	Decimal, Binary, and hexadecimal Number systems and their inter conversion, Binary addition, subtraction, multiplication and division, signed and unsigned binary numbers, 1's and 2's complement representation.	
UNIT II	Boolean algebra	(9)
	Partial Order Set, Hasse diagram, Lattice: Definition, principle of duality, Bounded, Distributive and Complemented lattice, Boolean algebra, Boolean expressions and Boolean functions, Disjunctive and conjunctive normal forms and examples, Simplification of switching circuit.	
UNIT III	Graphs and Trees	(8)
	Definition and Types of graphs, concept of degree of vertex, Hand-Shaking Lemma, Matrix representation of graphs: Adjacency matrix and Incidence matrix, Trails, Paths and Circuits, Connected and disconnected graph, Dijkstra's shortest path algorithm, Definitions and examples of trees, rooted trees, binary trees and their properties, spanning trees, Kruskal's algorithm.	
UNIT IV	Directed Graphs	(7)
	Definition, concept of degree of vertex, types of directed graphs, directed paths and cycles, connectivity and strongly connected digraphs, Directed (rooted) trees, arborescence and Polish notation, Network and flows: Definition, examples, Maximal flow algorithm.	

Course Outcomes: Student will be able to ...

1. apply addition and subtraction of Decimal, Binary, hexadecimal number systems and their conversions.
2. use the Boolean expression and Boolean functions.
3. evaluate the concept of graphs and various algorithms.
4. implement the types of directed graphs and their application.

Reference Books:

1. Discrete Mathematics with Applications, Susanna S. Epp, PWS Publishing Company, 1995. (Brooks/Cole, Cengage learning, 2011)
2. Digital Fundamentals, Thomas L. Floyd, Pearson Education Asia (1994)
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, McGraw Hill, 2002.
4. Narsing Deo, Graph Theory with Applications to Computer Science and Engineering (India: Prentice Hall, 1974)
5. U. Langote, Discrete Mathematics (Pune: Tech-Max Publications, 2009)

BCSET 115: Computational Statistics I

Course Objectives: Students should be able to ...

- i) Understand the basic concepts of statistics
- ii) Perform Frequency distribution and data presentation
- iii) Compute various measures of central tendency and dispersion
- iv) Compute various Moments, Skewness and Kurtosis
- iv) Analyze the data and interpret the results.

Credits=2	SEMESTER-I BCSET 115: Computational Statistics I	No. of hours per unit (30)
UNIT I	Data Condensation and Graphical Methods	(7)
	Definition, importance, scope and limitations of statistics w.r.to computer science, Data Condensation: Raw data, Attributes and variables, discrete and continuous variables, Scales of measurement: Nominal, Ordinal, Interval and Ratio classification and construction of frequency distribution, Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive Curves and their uses, Box-Plot, Examples.	
UNIT II	Measures of central tendency	(8)
	Concept of central tendency, Criteria for good measures of central tendency, Arithmetic mean: Definition, computation for ungrouped and grouped data, combined mean, weighted mean, merits and demerits, Median: Definition, formula for computation for ungrouped and grouped data, graphical method, merits and demerits, Mode: Definition, formula for computing for ungrouped and grouped data, merits and demerits, Quantiles: Definition, formula for computation for ungrouped and grouped data, graphical method, Numerical problems.	
UNIT III	Measures of Dispersion	(8)
	Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion, Range and Quartile Deviation: definition for ungrouped and grouped data and their coefficients, merits and demerits, Mean Deviation: definition for ungrouped and grouped data, minimal property (statement only), Standard deviation and Variance: definition for ungrouped and grouped data, coefficient of variation, combined variance and s.d. for two groups, merits and demerits, Numerical problems.	
UNIT IV	Moments	(7)
	Raw and central moments: definition for ungrouped and grouped data (only first four moments), relation between central and raw moments (statement only), Sheppard's Correction, Measures of skewness: Types of skewness, Pearson's and Bowley's coefficient of skewness, Measures of skewness based on moments, Measures of Kurtosis: Types of kurtosis, Measures of kurtosis based on moments, Numerical problems.	

Course Outcomes: Students will be able to ...

- i) Apply various types of sampling methods to data collection.
- ii) Create and interpret frequency tables.
- iii) Display data graphically and interpret graphs
- iv) Recognize, describe, and calculate the measures of central tendency and dispersion
- v) Calculate Moment, Skewness and Kurtosis for shape of the data

Books Recommended:-

1. S. P. Gupta. Statistical Methods, 48th Edition, New Delhi, Sultan Chand and Sons, 2022.
2. S.C.Gupta and V.K.Kapoor Fundamental of Mathematical Statistics, 12th Edition, New Delhi, Sultan Chand and Sons Publication, 2020.
3. S. C. Gupta. Fundamental of Statistics, 7th Edition, Mumbai, Himalaya Publishing House, 2018.
4. A.M. Mood, F.A. Graybill and D.C.Boes, Introduction to the Theory of Statistics, Third Edition, New Delhi, Tata McGraw-Hill Pub. Co. Ltd., 2017.
5. A. M. Goon, M. K. Gupta, B. Das Gupta. Fundamentals of Statistics, 9th Edition, Calcutta, The World Press Private Ltd., 2017.
6. B. L. Agarwal Basic Statistics, 6th Edition, New Delhi, New Age International Private Ltd. 2013.
7. Murray R. Spiegel, Larry J. Stephens, Statistics, 4th Edition, New Delhi, Tata MacGraw-Hill Publishing Company Ltd., 2010.
8. Amir D. Aczel, Jayavel Sounderpandian. Complete Business Statistics, 6th Edition, New Delhi, Tata MacGraw-Hill Publishing Company Ltd., 2006.

BCSEP 116- Lab II

(Computational Mathematics – I and Computational Statistics-I)

Course Objectives: - Student should be able to:

1. Understand Decimal, Binary and hexadecimal number systems.
2. Apply various algorithms of graph and directed graph.
3. Compute various measures of central tendency and dispersion
4. Compute Moments, Skewness and Kurtosis

Credits=2	BCSEP 116- Lab II- Computational Mathematics – I and Computational Statistics-I	No. of hours per unit/ credits (60)
Group A	Computational Mathematics-I	
	1. Interconversion of a Number system to another number system. 2. 1's and 2's complement with an example. 3. Representation of lattice with an example. 4. Disjunctive and Conjunctive normal forms of Boolean expression. 5. Switching Circuit with an example. 6. Dijkstra's shortest path algorithm. 7. Kruskal's algorithm to find shortest spanning tree. 8. Maximal flow algorithm.	
Group B	Computational Statistics-I	
	1) Construction of Discrete frequency distributions 2) Construction of Continuous frequency distributions 3) Graphical Representation 4) Diagrammatic Representation 5) Measures of Central Tendency (Ungrouped data) 6) Measures of Central Tendency (Grouped data) 7) Measures of dispersion (Ungrouped data) 8) Measures of dispersion (Grouped data) 9) Moments, Skewness and Kurtosis (Ungrouped data) 10) Moments, Skewness and Kurtosis (Grouped data)	

Course Outcomes: Student will be able to ...

1. apply addition and subtraction of Decimal, Binary, hexadecimal number systems and their conversions.
2. use the Boolean expression and Boolean functions.
3. compute various measures of Central Tendency and Dispersion
4. compute the Moment, Skewness and Kurtosis and identify the shape of distribution

Reference Books:

1. Discrete Mathematics with Applications, Susanna S. Epp, PWS Publishing Company, 1995. (Brooks/Cole, Cengage learning, 2011)
2. Digital Fundamentals, Thomas L. Floyd, Pearson Education Asia (1994)
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, McGraw Hill, 2002.
4. A.M. Mood, F.A. Graybill and D.C. Boes, Introduction to the Theory of Statistics, Third Edition, New Delhi, Tata McGraw-Hill Pub. Co. Ltd., 2017.
5. A. M. Goon, M. K. Gupta, B. Das Gupta. Fundamentals of Statistics, 9th Edition, Calcutta, The World Press Private Ltd., 2017.
6. B. L. Agarwal Basic Statistics, 6th Edition, New Delhi, New Age International Private Ltd. 2013.

BCSET 117: Computational Electronics I

Course Objectives: - Student should be able to:

1. learn the principle of circuit analysis and design.
2. study the basic concepts and characteristics of electronic devices and circuits.
3. understand AC sources, DC sources and their concept.
4. describe the theoretical concept through laboratory experiment.

Credits=2	SEMESTER-I BCSET 117: Computational Electronics I	No. of hours per unit/ credits
UNIT I	Basic components and Network Theorems	(9)
	AC Sources, DC Sources, Concept of Single Phase, Three phase, Power Supplies, Active, Passive Components, Resistor, Capacitor, Inductor, Transformer. (Qualitative Idea) Ohm's Law, Kirchhoff's Law, Thevenin's theorem, Norton Theorem, Superposition Theorem.	
UNIT II	Semiconductor Device	(7)
	Doping, P-N junction Diode, Characteristics, Clipper, Clamper, LED, Photodiode, BJT, Modes of Transistor.	
UNIT III	Amplifiers and Oscillators	(7)
	Transistor Amplifiers, Introduction of Oscillator, Phase Shift, Wein Bridge, Hartley, Colpitts, Crystal Oscillator.	
UNIT IV	Multivibrators	(7)
	UJT as sweep generator, Transistor as Astable, Bistable and Monostable Multivibrator. Using IC 555 as Astable and Monostable Multivibrator.	

Course Outcomes: - Student will be able to...

1. categorize the basic electronic components.
2. examine electronic circuits using network theorems.
3. build various Oscillators Circuits.
4. construct multivibrators for electronic applications.

Reference Books:

1. A text of Applied Electronics, R. S. Sedha, S Chand Publication. (Unit-1,2,3,4)
2. Basic Electronics and linear circuits: N. N. Bhargava, D. C. Kulshreshtra, S. C. Gupta, Tata McGraw Hill Publication. (Unit-1,2)
3. Electronic Devices and Circuits, Boyistead, Tata McGraw Hill (Unit- 1,2,3)
4. Electronic Devices, David A Bell, Reston publishing company (Unit-3,4)

BCSET 118: Computational Electronics II

Course Objectives: -

Student should be able:

- i. Understand Logic gates and its interconversion.
- ii. Learn Boolean Laws and solve K-Map.
- iii. Understand designing and analyzing attitude about sequential circuits.
- iv. Learn designing and analyzing attitude about Combinational circuits.

Credits=2	SEMESTER-I BCSET 118: Computational Electronics II	No. of hours per unit/ credits
UNIT I	Logic Gates	(8)
	AND, OR, NOT, NOR, NAND, EX-OR (Symbol, Expression and Truth Table), Universality of Logic Gates, ASCII Code, De Morgan's theorem, SOP, POS, Boolean Laws and rules, K-map. Introduction to logic families: TTL NAND Gate.	
UNIT II	Sequential circuits	(8)
	Latch, Flip Flops-RS Flip flop, Clocked RS Flip flop, D Flip flop, JK Flip flop, T Flip flop, Counters- 3 bit asynchronous, 3bit synchronous, Shift registers: SISO, SIPO, PISO, PIPO.	
UNIT III	Combinational Circuits	(6)
	Half adder, Full adder, Parallel adder, Half subtractor, Full Subtractor, Encoder, Decoder, Multiplexer and De-Multiplexer.	
UNIT IV	Memory Organization & I/O Devices	(8)
	Introduction of Computer, Concept of Bus, Computer I/O devices, Memory: RAM, SRAM, DRAM, ROM, PROM, EPROM, EEPROM, FLASH, Arithmetic logic unit.	

Course Outcomes: Student will be able to:

- i. Design and construct logic gates.
- ii. Analyze and solve the K-Map.
- iii. Design and analyze sequential and combinational circuits.
- iv. Analyze the computer system.

Reference Books:

1. Digital Fundamentals, Thomas L. Floyd, Pearson Education Asia (1994)
2. Digital System Design, M. Morris Mano, Pearson Education Asia (Third edition)
3. Digital Principles and applications, Malvino Leach, Tata McGraw Hill, 4th Edition
4. Digital Electronics, C.F. strahglo

BCSEP 119- Lab III

(Computational Electronics – I and Computational Electronics – II)

Course Objectives: - Student should be able to:

- 1) Learn basic electronic circuits and operations of Multimeter, CRO, function generator, power supplies.
- 2) Use Laws and theorem and the characteristics of P-N Diode, FWR etc.
- 3) Learn logic gates and verify De-Morgan's theorem.
- 4) Understand the concept of Flip-Flops, adders, multiplexer, and De-multiplexer.

Credits=2	BCSEP 119- Lab III- Computational Electronics – I and Computational Electronics – II	No. of hours per unit/ credits (60)
Group A	Computational Electronics – I	
	1. Study of Electronics components. 2. Study of CRO. 3. Verification of Kirchhoff's Law. 4. Verification of Thevenin's Theorem. 5. Study of I-V characteristics of PN junction Diode. 6. Study of Half wave Rectifier. 7. Study of Full wave Rectifier. 8. Study of Astable multivibrator using BJT/555. 9. Study of Monostable multivibrator using BJT/555. 10. Study of the Phase shift Oscillator using transistor.	
Group B	Computational Electronics – II	
	1. Study of Logic Gates. 2. Basic gates using NAND gate. 3. Basic gates using NOR gate. 4. Study and Verify De-Morgan's Theorem. 5. Study of Half Adder. 6. Study of Full Adder. 7. Study of Multiplexer using IC 74153. 8. Study of RS Flip-Flop. 9. Study of JK Flip-Flop. 10. Study of CPU and I/O devices.	

Course Outcomes: Student will be able to ...

- 1) Design and analyze basic electronics components and circuit.
- 2) Analyze the operations of multi-meter (Analog & digital), function generator, power supply and CRO.
- 3) Design and analyze sequential logic circuits.
- 4) Design and analyze combinational logic circuits.

Reference Books:

1. A text of Applied Electronics, R. S. Sedha, S Chand Publication.
2. Basic Electronics and linear circuits: N. N. Bhargava, D. C. Kulshreshtra, S. C. Gupta, Tata McGraw Hill Publication.
3. Digital Principals and applications, Melvino Leach, Tata McGraw Hill, 4th Edition
4. Digital Electronics, C.F.strahglo

SEMESTER-II
BCSET 121: C Programming – II

Course Objectives: - Course Objectives: - Student should be able to...

1. Develop a Programming logic.
2. Teach basic principles of programming.
3. Develop skills for writing programs using ‘C’.

Credits=2	SEMESTER-II BCSET 121: C Programming – II	No. of hours per unit/ credits
UNIT I	Arrays	(8)
	Definition and declaration of array; Features of Array; Initialization of array; Memory representation of array; Types of Arrays-Single Dimensional Array; Two-Dimensional Array; Multi-Dimensional Array. Addition of array; multiplication of arrays	
UNIT II	Pointers	(7)
	Definition and declaration; Pointer initialization; Operations on pointer; Use of Pointer in Function; Array of Pointer; Pointer of pointer; Dynamic memory allocation	
UNIT III	Structures and Union	(7)
	Definition and declaration; Array of structures; Passing structure to function; Pointer to structure; Nested structure; self-referential structure; Sizeof() and typedef (); Definition of Union and declaration; Difference between structure and Union;	
UNIT IV	File Handling	(8)
	Concept of File; Text and binary files; Opening and closing files; File opening mode- (read, write, append); Character and integer handling (getc(), putc(), getw(), putw()); Formatted input-[scanf(), sscanf(), fscanf(), fread()]; Formatted output- (printf(), sprintf(), fprintf(), fwrite()]; Functions-[fseek(), ftell(), fflush(), fclose(), fopen(), rewind()];	

Course Outcomes: Student will be able to ...

1. Explain different basic concepts arrays in C
2. Describe the different concepts of operations on Pointers.
3. Discuss the concepts of Structure and Union.
4. Implement File handling in C.

Reference Books:-

- 1) Let Us C – Yashwant Kanetkar, BPB Publications, 18th Edition 25 Nov 2021
- 2) Programming In Ansi C By Balaguruswamy 7th Edition McGraw Hill
- 3) The C Programming Language by Brian Kernighan and Dennis Ritchie 1978
- 4) C: The Complete Reference. By Herbert Schildt 1987

BCSET 122: Relational Data base Management System

Course Objectives: - Student should be able to ...

1. Study the concepts and terminologies of RDBMS
2. Understand SQL concepts.
3. Study MySQL Concepts
4. Understand PL/SQL

Credits=2	SEMESTER-II BCSET 122: Relational Data base Management System	No. of hours per unit/ credits
UNIT I	Introduction to RDBMS	(8)
	Data; Database; DBMS, RDBMS; Concepts of Data Models object based; Record based (Network; Hierarchical; Relational); Physical; Concept of RDBMS Terminologies: relation; attribute; domain; tuple; entities; DBA and Responsibilities of DBA; Relational Model: Structure of Relational Database; Relational Algebra.	
UNIT II	Structured Query Language (SQL)	(7)
	SQL: Data types-fixed length; variable length; ex., Data Constraints-Primary key; Foreign key; Null; Check; Default Clauses-(select, where, group by, order by); SQL Operators: Logical; Relational; Special-In; Between; Like Sub Queries and Join-Sub queries and Nesting sub queries; Join: Equijoin; Simple join; Outer join; self-join; Views; Indexes; Sequence	
UNIT III	Introduction to MySQL	(7)
	Basic Concepts; Difference between SQL and MySQL; Creating a Database and Tables; Inserting; Selecting; Ordering; Limiting; Grouping; Analyzing and Manipulating Data; Changing; Deleting; Searching; Database and Table Schema Statements; Data Manipulation Statements and Functions; Table; Statements and Functions; Replication Statements and Functions; Aggregate Clauses; Aggregate; Functions; String Functions; Date and Time Functions; Mathematical Functions;	
UNIT IV	Introduction to PL-SQL	(8)
	Comparison between SQL & PL-SQL; Structure of PL-SQL block; Benefits of PL/SQL over SQL; Control structure: if statement; case statement; Loops-Simple looping; For; While; Need of Iterative and; looping statements in data handling;	

Course Outcomes: Student will be able to ...

1. Explain concept of RDBMS.
2. handle SQL.
3. handle MySQL.
4. Discuss basics of PL-SQL.

Reference book-

1. C. J. Date, A. Kannan, and S. Swamynathan, *An Introduction to Database Systems*, Pearson Education, Eighth Edition, 2009.
2. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, *Database System Concepts*, McGraw-Hill Education (Asia), Fifth Edition, 2006.
3. Shio Kumar Singh, *Database Systems Concepts, Designs and Application*, Pearson Education, Second Edition, 2011.
4. Peter Rob and Carlos Coronel, *Database Systems Design, Implementation and Management*, Thomson Learning-Course Technology, Seventh Edition, 2007.

BCSEP 123: Lab IV- (C Programming – II and Relational Data base Management System)

Course Objectives: - Student should be able to ...

1. Develop a Programming logic.
2. Develop skills for writing programs using ‘C’.
3. Study the concepts and terminologies of RDBMS
4. Understand SQL concepts.

Credits= 2	SEMESTER-I BCSEP 123: Lab IV- (C Programming – II and Relational Data base Management System)	No. of hours per unit/ credits (60)
Group A	C Programming – II	
	<ol style="list-style-type: none"> 1) Write a program to calculate sum and average of given n numbers using array. 2) Write a program to add two Matrices; Use Two-Dimensional array. 3) Write a program to multiplication of two Matrices. 4) Student should explain program to reverse string using Pointer. 5) Write a program to perform Operation on Pointer. 6) Student should demonstrate a program that accepts the Roll No, Name, Marks obtained in three tests of ‘N’ students & display the total and Average in tabular format. 7) Write a program to create Union for 5 records of Student. 8) Write a program of Pointer to structure. 9) Student should Write a program to separate even and odd numbers available in input file. 10) Write a program to Create emp.txt file and save 5 records of Employee 	
Group B	Relational Data base Management System	
	<ol style="list-style-type: none"> 1. Create Database Railway System with appropriate Constraints <ol style="list-style-type: none"> a) Insert any 5 records b) Show the employee record who work in TC Department (using Group By Clause) 2. Create Database Library with appropriate Constraints <ol style="list-style-type: none"> a) Insert any 5 records b) Show the record of Books using Join 3. Create Database School with appropriate Constraints <ol style="list-style-type: none"> a) Insert any 5 records b) Show the record of Student with Topper, Lowest, Average, Total 4. Create table Stock Details in Computer Department. <ol style="list-style-type: none"> a) Insert any 5 records Create Procedure to display record in the month of August 2021 5. Create Database shop with appropriate Constraints <ol style="list-style-type: none"> a) Insert five records b) Show the record of shop with Highest Price thing , Average profit, Total profit 	

Course Outcomes: Student will be able to ...

- i. Explain different basic concepts arrays in C
- ii. Discuss the different concepts of operations on Pointers.
- iii. handle MySQL.
- iv. Explain concepts of PL-SQL.

Reference Books: -

1. The C Programming Language by Brian Kernighan and Dennis Ritchie 1978
2. C: The Complete Reference. By Herbert Schildt 19873.
3. C. J. Date, A. Kannan, and S. Swaminathan, *An Introduction to Database Systems*, Pearson Education, Eighth Edition, 2009.
4. Abraham Silber Schatz, Henry F. Korth and S. Sudarshan, *Database System Concepts*, McGraw-Hill Education (Asia), Fifth Edition, 2006.

BCSET 124: Computational Mathematics II

Course Objectives: Students Should be able to ...

- i) Understand recursive techniques to count elements of set.
- ii) Apply the concept of Number Theory.
- iii) Learn concept of relation and function
- iv) Analyze the concept of recurrence relation.

Credits=2	SEMESTER-II BCSET 124: Computational Mathematics II	No. of hours per unit
UNIT I	Counting Principles	(8)
	Counting: Addition & Multiplication principle, Permutation and Combination, Cardinality of finite set, Cardinality of union of sets (Addition principle), Principle of Inclusion and Exclusion. Examples. Combinatorial Arguments, Pigeonhole Principle (Statement only). Examples.	
UNIT II	Divisibility of integers & Groups	(8)
	Divisibility: Definition and properties, Division algorithm (with proof), Greatest Common Divisor (g.c.d.), Least Common Multiple (L.C.M), Euclidean algorithm (Statement only & examples), Binary operation Group : Definition and examples.:- Simple properties of groups, Sub – Group, Semi group and Monoids : Definition and examples	
UNIT III	Relation and Functions	(7)
	Ordered pairs, Cartesian product, Relations, Types of relations, Equivalence relation, Partial ordering, Digraphs of relations, matrix representation and composition of relations, Transitive closure, Warshall's algorithm, Equivalence class, Partition of a set Functions : Definition, Types of mapping, Injective, Surjective & Bijective functions, Inverse function, Composition of functions	
UNIT IV	Recurrence Relations	(7)
	Introduction, Recurrence relation: Definition formula Example, Linear Recurrence relation with constant coefficient. Homogeneous solutions, Particular and Total solution, Factorial Representation, Fibonacci number	

Course Outcomes: Student will be able to ...

- i. Demonstrate mathematical skills, analytical and critical mathematical thinking abilities.
- ii) Analyze the types of relations and functions.
- iii). Analyze and demonstrate properties of divisibility of positive integers.
- iv) Construct and solve recurrence relations

Reference book-

1. Oscar Levin, Discrete Mathematics – An Open Introduction (Greeley: University of Northern Colorado press, 2013)
2. Ken Levasseur, Al Doerr., Applied Discrete Structures (Pearson Education, Inc. 2012),
3. Davender Malik, Discrete Mathematics (India: Indian Binding House, 2009),
4. Song Y Yang, Number Theory for Computing (New York: Springer, 2002)

BCSET 125: Computational Statistics II

Course Objectives: Students will be able to ...

- i) Understand the basic concepts of probability
- ii) Compute various discrete and continuous probability distributions
- iii) Apply various test in real life examples
- iv) Analyze the data and interpret the results.

Credits=2	SEMESTER-II BCSET 125: Computational Statistics II	No. of hours per unit
UNIT I	Probability	(8)
	Idea of permutation and combination, concept of experiments and random experiments, Definitions: sample space, discrete sample space, continuous sample space, events, types of events, power set (sample space consisting at most 3 sample points), Illustrative examples, Classical (apriori) definition of probability of an event, equiprobable sample space, simple examples of probability of an events based on permutations and combinations, axiomatic definition of probability, Theorems on probability: i) $P(\Phi) = 0$ ii) $P(A') = 1 - P(A)$ iii) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ iv) If $A \subseteq B$, $P(A) \leq P(B)$ v) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$, Illustrative examples.	
UNIT II	Conditional probability and independence of events	(8)
	Definition of conditional probability of an event, Partition of sample space, Baye's theorem (only statement), concept of prior and posterior probability, Concept of independence of two events, Proof of the result that if A and B are independent events then i) A and B' ii) A' and B iii) A' and B' are also independent, Pairwise and complete independence of three events, examples.	
UNIT III	Univariate probability distributions	(7)
	Definitions: discrete random variable, probability massfunction (p.m.f.), cumulative distribution function (c.d.f.), properties of c.d.f., median, mode, p.g.f., Definition of expectation of a random variable, expectation of a function of random variable, variance, Results on expectation: i) $E(c) = c$, where c is constant, ii) $E(aX + b) = a E(X) + b$, where a and b are the constants, iii) $V(c) = 0$, where c is constant, ii) $V(aX + b) = a^2 V(X)$, where a and b are the constants, Examples.	
UNIT IV	Some standard discrete probability distributions	(7)
	Discrete uniform distribution: p.m.f., mean and variance, Binomial distribution: p.m.f., mean and variance, additive property of binomial variates, recurrence relation for probabilities, Poisson distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, Poisson distribution as a limiting case of binomial distribution (without proof), examples.	

Course Outcomes: Student will be able to ...

- i) Compute probability and conditional probabilities.
- ii) Check for independence of events.
- iii) Perform probability calculations relating to discrete probability distributions.
- iv) Apply various distributions to solve real life problems.

Reference book-

1. S.C.Gupta and V. K. Kapoor Fundamental of Mathematical Statistics, 12th Edition, Delhi, Sultan Chand and Sons Publication, 2020.
2. A.M. Mood, F.A. Graybill and D.C.Boes, Introduction to the Theory of Statistics, 3rd Edition, New Delhi Tata McGraw-Hill Pub. Co.Ltd., 2017.
3. B. R. Bhat, Modern Probability Theory- An Introductory Textbook, 4th Edition, New Delhi, New Age International Publishers, 2016.

Lab Course Based on BCSET 124 and BCSET 125

BCSEP 126: Lab Course on Mathematics and Statistics

Course Objectives: Students should be able to ...

- i) develop skills of different Algorithms with an examples .
- ii) find transitive closure by using Warshall’s algorithm .
- iii) fit and model various continuous probability distributions.
- iv) compute large and small sample test and study association between two variables.

Credits= 2	SEMESTER-I BCSEP 126: Lab IV- (Lab Course on Computational Mathematics-II and Computational Statistics-II)	No. of hours per unit/ credits (60)
Group A	Computational Mathematics-II	
	1) Permutation 2) Combination 3) Inclusion and Exclusion Principle 4) Division Algorithm 5) Euclidean Algorithm 6) Transitive Closure by using Warshall’s algorithm 7) Group 8) Function 9) Representation of relation by matrix and diagraph. 10)Recurrence RelationWith an example.	
Group B	Computational Statistics-II	
	1) Probability 2) Conditional Probability 3) Probability for Independence and Mutually Exclusive events 4) Baye’s Theorem 5) Fitting of Discrete Uniform distribution 6) Fitting of Binomial distribution 7) Fitting of Poisson distribution 8) Model Sampling of Discrete Uniform distribution 9) Model Sampling of Binomial distribution 10) Model Sampling of Poisson distribution.	

Course Outcomes: Student will be able to ...

- i) Use different algorithms.
- ii)Use Warshall’s algorithm for transitive closure.
- iii) Fitting various discrete probability distributions

iv) Model sampling for various discrete probability distributions

Reference Books: -

1. Davender Malik, Discrete Mathematics (India: Indian Binding House, 2009), Unit 1: 226-262, Unit 3: 413-442, Unit 4:263-291.
2. Song Y Yang, Number Theory for Computing (New York: Springer, 2002)
3. J.E. Freund, Mathematical Statistics with Applications, 8th Edition, London, Pearson Publication, 2014.
4. Irwin Miller, Marylees Miller, John E. Freund, Mathematical Statistics, 8th Edition, Prentice Hall of India, 2013.

BCSET 127: Computational Electronics III

Course Objectives: Students Should be able to ...

1. learn the instructions of 8085 microprocessor.
2. understand memory organization.
3. learn architecture and instruction set of 8051 microcontroller.
4. To understand interfacing of microcontroller.

Credits=2	SEMESTER-II BCSET 127: Computational Electronics III	No. of hours per unit
UNIT I	Introduction to Microprocessor 8085	(8)
	Introduction and Evolution of Microprocessor, Microprocessor Development w.r.t. CISC/ RISC families, Intel, Power PC, CPU registers- Arithmetic and Logic Unit, GPR's and SPR's, Stack, Addressing Modes, Instruction formats and categories, Instruction Set – Data transfer, Arithmetic, Logical, Branch operations.	
UNIT II	Microprocessor Memory Organizations	(8)
	Memory Management, data and Code memory, interfacing memory with microprocessor, Computer Peripherals and Interfacing (Peripheral Control Signals), Peripheral Mapping- Memory Mapped, I/O Mapped. Ports- Parallel and Series.	
UNIT III	Introduction to Microcontroller 8051	(7)
	Introduction and Evolution of Microcontroller, Architecture of 8051: Block Diagram of 8051 and Study of Internal Blocks, Reset and Clock, Registers, Flags and Internal Memory, Special Function Registers, I/O Ports.	
UNIT IV	Interfacing of microcontroller	(7)
	Study of 8051 Instruction Set and Addressing Modes, Timer and Counter, Time delay generation, Serial Ports, Interfacing LED, LCD, 7- Segment display, Stepper Motor.	

Course Outcomes: Student will be able to ...

- 1.Design and develop programs based on 8085 microprocessor
- 2.Elaborate microprocessor memory organization.
- 3.Design and develop programs based on 8051 microcontroller.
- 4.Interface with LED, LCD and Steeper motor using 8051

Reference book-

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar, PenRam International Publishing Pvt. Ltd. (India), Fifth Edition, 2009
2. Microprocessor and Microcontroller, Krishna Kant, PHI Learning Pvt. Ltd. Delhi, Eleventh Edition, 2013
3. Fundamentals of Microprocessor and Microcontroller, B. Ram, Dhanpat Rai Publications Ltd. New Delhi, Eighth Edition, 2016
4. The 8051 Microcontroller and Embedded Systems, Muhammad A. Mazidi, J.G. Mazidi, R.D. Mckinlay, Pearson India Education Services Pvt. Ltd., Seventeenth Edition, 2017

BCSET 128: Computational Electronics IV

Course Objectives: Students will be able to ...

1. introduce basic concepts of computer peripheral devices
2. study the Computer Applications in medical industries
3. learn Computer Networks
4. Understand Network Components

Credits=2	BCSET 128: Computational Electronics IV	No. of hours per unit
UNIT I	Basic Study of Computer Peripheral	(8)
	Printers- Dot matrix, Inject, LASER, Line Printer. Scanners- Hand belt, Flat belt. Web Camera, CCTV, IPCamera. Input Peripherals- Keyboard, Mouse, Touch Screen, Joystick.	
UNIT II	Computer Applications in Industries	(6)
	Automobiles, Consumer Electronics, Education, Research Industries, Healthcare, Banking, Entertainment, Finance, Business	
UNIT III	Fundamentals of Computer Networking	(8)
	Need of Computer Network, Network types- LAN, MAN, WAN, Internet, Network Topology, and OSI References.	
UNIT IV	Network Components	(8)
	Internet, Bridge, Router, Server, Switch, Firewall. Communication medium- Cables, Twisted pair, Single Twisted pair, Co-axial Cable, Fiber Optic Cable. Wireless Communication medium- Wi-Fi, Bluetooth.	

Course Outcomes: Student will be able to ...

1. introduce basic concepts of computer peripheral devices
2. study the Computer Applications in medical industries
3. learn Computer Networks
4. Understand Network Components

Reference book-

1. Computer Networking-Vishnu priya shingh.
2. Computer Networks-Tanenbaum, Andrew.S.
3. Computer Peripherals and Interfacing-Jyoti Snehi.
4. Data communication-Frouzan

Lab Course Based on BCSET 127 and BCSET 128

BCSEP 129: Lab Course on Computational Electronics-III and Computational Electronics-IV

Course Objectives: Students should be able to ...

- i) learn the instructions of 8085 microprocessor.
- ii) understand memory organization.
- iii) learn Computer Networks
- iv) understand Network Components

Credits= 2	SEMESTER-I BCSEP 126: Lab IV- (Lab Course on Computational Electronics-III and Computational Electronics-IV)	No. of hours per unit/ credits (60)
Group A	Computational Electronics-III	
	<ol style="list-style-type: none"> 1. Arithmetical operation using 8085 microprocessor. 2. Shifting of data 8 bit numbers using 8085 microprocessor. 3. To find smallest and largest number from the given series in 8085 microprocessor. 4. Write assembly language code in 8085 microprocessor to find factorial of a given number. 5. Write assembly language code in 8085 microprocessor to implement stack instruction. 6. Arithmetical operation using 8051 7. Logical operation using 8051 8. Time Delay generation using timers 8051. 9. Stack operation in 8051 microcontroller. 10. Interfacing of LED using 8051 microcontroller. 	
Group B	Computational Electronics-IV	
	<ol style="list-style-type: none"> 1. Write specification of latest Desktop 2. Write specification of latest laptop 3. Printer Installation And Servicing 4. Printer installation and Trouble Shooting 5. Install and Configure Scanner 6. Install and Configure Web Cam Devices with System 7. Trouble shooting Problem of Web Cam 8. Familiarization with network Component and devices. 9. Familiarization With LAN Adapter Switches and Router 10. Understanding communication Medium 	

Course Outcomes: Student will be able to ...

- i) Design and develop programs based on 8085 microprocessor
- ii) Elaborate microprocessor memory organization.
- iii) learn Computer Networks
- iv) understand Network Components

Reference Books: -

- I. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar, PenRam International Publishing Pvt. Ltd. (India), Fifth Edition, 2009
- II. Microprocessor and Microcontroller, Krishna Kant, PHI Learning Pvt. Ltd. Delhi, Eleventh Edition, 2013
- III. Computer Peripherals and Interfacing-Jyoti Snehi.
- IV. Data communication-Frouzan