"Education for knowledge, science and culture"
Shikshanmaharshi Dr. Bapuji Salunkhe
Shri Swami Vivekanand Shikshan Sanstha's
Vivekanand College (Autonomous), Kolhapur.
B.Sc (Computer science Entire) Part –I
CBCS Pattern 2021-22

Structure of B.Sc. (Computer Science Entire) Part I CBCS Syllabus with effect from June, 2021

Sr. No	Course Name	Paper name	Credits	Marks
Semester I				
1	GEC-1300A	Discrete mathematics Algebra	04	80+20=100
2	GEC-1301A	Analogue electronics-I Digital electronics	04	80+20=100
3	GEC-1302A	Descriptive statistics-I Probability & discrete probability	04	80+20=100
4	CC-CS- 1303A	Introduction to computers-I Programming in 'C'-I	04	80+20=100
5	AECC-A	Communication Skills-I	02	40+10=50

Semester II				
6	GEC-1300B	Graph theory Calculus	04	80+20=100
7	GEC-1301B	Analog electronics-II Microprocessor & assembly language programming	04	80+20=100
8	GEC-1302B	Descriptive statistics-II Continuous probability distribution & testing of hypothesis	04	80+20=100
9	CC-CS-1303B	Introduction to computers-II Programming in 'C'-II	04	80+20=100
10	AECC-B	Communication Skills-II	02	40+10=50
11	GEC-1300P1	Mathematics Lab course	04	100
12	GEC-1301P1	Electronics Lab course	04	100
13	GEC-1302P1	Statistics Lab course	04	100
14	CC-CS1303P1	Computer Science Lab Course	04	100
			52	1300

• **Student contact hours per week : 65 Hours (Min.)**	• **Total Marks for B. Sc. (Computer Science Entire) – I_(Including English) : 1300**
• **Theory and Practical Lectures : 48 Minutes Each**	• **Total Credits for B. Sc. (Computer Science Entire) Sem-I &II - 52**
• **AECC- Ability Enhancement Compulsory Course -English** • **GEC-General elective course. (for Semester I--A and for semester II--B)** • **CC- Core course (computer science)** • **Course list as per enclosed Annexure. *Separate passing is mandatory for Theory, Internal and Practical.***	
• **Practical Examination will be conducted annually for 100 Marks per GEC course (subject).**	

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

Nature of Question Paper ----- Total 80 Marks

Paper-I

Q.No.1 Multiple Choice based objective type question 08 Marks
(Four options for each question be given)
Q.No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks
Q.No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Paper-II

Q.No.1 Multiple Choice based objective type question 08 Marks
(Four options for each question be given)
Q.No.2 Attempt any two of the following –long Answers (out of three) 16 Marks
Q.No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

Semester-I

MATHEMATICS GEC-1300A
Theory: 60 Hours (75 Lectures) credits -4
Paper – I Discrete Mathematics

After completing this course satisfactorily a student will:

1. Be able to construct simple mathematical proofs and possess the ability to verify them.
2. Have substantial experience to comprehend formal logic arguments.
3. Be able to apply basic counting techniques of combinatorial problems.
4. Be able to specify and manipulate basic mathematical objects such as sets, functions and relations and will also be able to verify simple mathematical properties that these objects possess.

Unit –1: Counting Principle **(9)**

1.1 Set: Definition, Types of sets.
1.2 Counting : Addiion&Muliplication principle, Permuation&Combinaion
- 1.2.1 Cardinality of finite set
- 1.2.2 Cardinality of union of sets (Addition principle)
- 1.2.3 Principle of inclusion & exclusion, examples

1.3 Combinatorial Arguments
1.4 Pigeonhole Principle (Statement Only), Examples

Unit – 2: Recurrence relations **(9)**

2.1 Introduction
2.2 Linear Recurrence relation with constant coefficient
2.3 Homogeneous solutions
2.4 Particular & Total solutions

Unit – 3: Logic **(11)**

3.1 Propositions & Logical connectives : Definition, Types of Propositions, Truth values & Truth Tables, Tautology & Contradiction, Logical equivalence
3.2 Rules of inferences
3.3 Valid arguments & proofs
3.4 Methods of proofs : Direct & indirect
3.5 Duality of the statement, Predicates& Quantifiers

Unit – 4: Fuzzy Mathematics **(8)**

4.1 Introduction: Fuzzy numbers, Fuzzy set.
4.2 Classical logic
4.3 Applying truth values- continuous variable
4.4 Linguistic variables

4.5 Types of Fuzzy Logics
4.6 Advantages of Fuzzy Logic
4.7 Disadvantages of Fuzzy Logic

Paper – II Algebra

Upon successful completion of this course students should be able to:

1. Classify numbers into number sets.
2. Determine when a function is one-one & onto.
3. Prove results involving divisibility & greatest common divisors.
4. Apply Fermat's theorem to find the remainder when any large number is divided by any other integer.

Unit – 1: Relations **(10)**

1.1 Functions : Definition, Types of mapping, Injective, Surjecive&Bijecive functions, Inverse function, Composition of functions
1.2 Ordered pairs, Cartesian product
1.3 Relations, Types of relations, Equivalence relation, Partial ordering
1.4 Other types of relation : Irreflexive, Assymmetric
1.5 Digraphs of relations, matrix representation & composition of relations
1.6 Transitive closure, Warshall's algorithm
1.7 Equivalence class, Partition of a set

Unit – 2: Divisibility of integers **(10)**

2.1 Introduction
2.2 Divisibility : Division algorithm (Statement only)
2.3 Greatest Common Divisor (g.c.d.), Least Common Multiple (l.c.m.)
2.4 Euclidean algorithm (Statement only), divisibility Test 1)by 10 (i.e. by 2 & 5) 2)by 11
2.5 Prime numbers, Euclide's lemma, Fundamental theorem of Arithmetic (without proof)
2.6 Congruence relation & its properties
2.7 Fermat's theorem (Statement only), examples
2.8 Residue classes : definition, examples, addition modulo n, multiplication modulo n

Unit – 3: Boolean Algebra **(10)**

3.1 POSET : definition
3.2 Hasse diagram
3.3 Lattice: definition, principle of duality
3.4 Basic properties of algebraic systems defined by Lattice
3.5 Distributive & complemented lattice
3.6 Boolean Lattice & Boolean algebra
3.7 Boolean expression &Boolean functions
3.8 Disjunctive &Conjuctive normal forms & examples
3.9 Finite state machines

Unit – 4 : Introduction to group theory **(8)**

4.1 Binary operation : definition
4.2 Semi group & Monoids : definition & examples
4.3 Group : definition & examples, simple properties of groups
4.4 Sub-group : definition & examples

Basic readings

1. Algebra Nirali Publication
2. Algebra & calculus Textbook of B.Sc. computer science, Vision Publication
3. Discrete Mathematics by S.R.Patil& others, Nirali Publication
4. Discrete Mathematics, Vision Publication
5. Elements of Discrete Mathematics by C.L.Liiu
6. Discrete Mathematics by Olympia Nicodemi
7. Algebra by Naik & Patil, PhadakePrakashan

GEC-1300P1 Paper Title: Laboratory Course Practical – I

1. Recurrence relation
2. Linear searching methods
3. Combinational Arguments
4. Euclid's algorithm, division algorithm
5. Fermat's theorem on remainder
6. Warshall's algorithm
7. D.N.F. & C.N.F.
8. Sorting methods
9. Finite state machine, input tape, output tape
10. Proofs of valid arguments using laws of inferences

Electronics GEC-1301 A
Theory: 60 Hours (75 Lectures) credits -4
Paper – I Analog electronics – I

Course Outcomes:

After the completion of the course the student will be able to:

1: Demonstrate and explain electrical components and determine the value of resistance of resistor,

Inductance of inductor and capacitance of capacitor using color code method.

2: Understand the basic properties of electrical elements, and solve DC circuit analysis problems,

DC network theorems.

3: To acquire the knowledge about the characteristics and working principles of PN junction diode,

Zener diode, photo diode, LED and different diode applications.

4: Understanding and designing of rectifier, filter and voltage regulator circuits.

Unit 1: Basic Circuit Elements (12)

Definition of active and passive elements.

Resistors: Classification, color code, specifications of resistors. Construction of Carbon composition, carbon film and wire wound resistors. Potentiometer.

Capacitors: Definition, Capacitance, capacitive reactance (XC), Charging and discharging of capacitor, Classification of capacitors, Construction of electrolyte capacitor.

Inductors: - Definition, symbol, Inductance, Inductive reactance (XL), Types of Inductors: - Air core, Iron core and ferrite core inductors.

Transformers:- Principle and construction of transformer, Types of Transformer: - Step-up, step-down transformer.

Switches: Explanation using Symbols.

Relay: - Principle, construction and working of electromagnetic relay.

Unit 2: DC Circuit Analysis (10)

Basic laws: Ohm's law, Kirchhoff's Current and Voltage Law, Concept of Current source, Voltage source. Application of Kirchhoff's laws to simple circuits.

Network Theorems: - (only for dc resistive circuit) Thevenin's Theorm, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem, (only statement and examples).

Unit 3: Semiconductor Diodes (06)

Formation of PN junction, Depletion layer, Barrier potential, Working and I-V characteristics of PN junction diode. Diode applications, Zener diode: Breakdown mechanism, Zener and Avalanche Break down, I-V characteristics. Photodiode and LED, Current limiting resister for LED, Applications- Optocoupler, 7-segment display.

Unit 4 DC Power Supply (10)

Block diagram of DC regulated power supply, Rectifiers (Half, Full, Bridge): different parameters of rectifiers, Filter circuits, Regulator: concept of Load and Line regulation. Zener diode as a voltage regulator, Concept of Three pin IC regulator (Block Diagram), positive and negative voltage regulator ICs, concept of SMPS.

Paper – II Digital electronics - I

Course Outcomes:

After the completion of the course the student will be able to:

1: Understanding the basics of Digital Electronics and different number systems and conversion between them.

2: Design and construction of the basic and universal logic gates and Studying the Boolean algebra and simplification of Boolean expression using different methods.

3: Understand, analyze and design various combinational circuits.
4: Understand, analyze and design various sequential circuits.

Unit 1: Number System, Binary Codes and Binary Arithmetic (10)

Different types of number systems (Decimal, Binary, Octal, Hexadecimal Number system), Inter conversion from one number system to another. Binary Codes (BCD code, Gray code, Exess-3 code, ASCII code). Concept of Parity (Odd, Even), 1's complement and 2's complement of binary numbers, Binary arithmetic: addition, subtraction (using 1's complement and 2's complement), Signed and unsigned numbers.

Unit 2: Logic Gates and Boolean Algebra (10)

Logic gates: AND, OR, NOT, NOR, NAND, EX-OR (Definition, Symbol, Expression and Truth Table), Universal gates (NAND and NOR).
Boolean algebra: Rules and laws of Boolean algebra, De-Morgan's Theorems, Simplifications of logic Expressions using a) Boolean algebra, b) K-map.

Unit 3: Combinational Circuits (07)

Concept of Combinational Circuits, Half adder, Full adder, half subtractor, Full Subtractor, 4-bit adder/subtractor, Multiplexer, Demultiplexer, Encoder (Decimal to BCD), Decoder (2: 4, 3:8, BCD to 7 segment decoder).

Unit 4: Sequential Circuits (10)

Concept of sequential circuits, *Flip-flops*: RS, Clocked RS, D, JK, Master Slave JK, T- Flip-flop, *Counters*- Asynchronous (3 – bit, 4 – bit, Decade) Synchronous (3 – bit, 4 – bit) Ring Counter, Johnson counter (Truth tables and timing diagrams)
Shift Registers: SISO (left shift, right shift), SIPO, PISO, and PIPO Registers (4-bit)

Statistics GEC-1302 A
Theory: 30 Hours (37 Lectures) Credits -4
Paper – I Descriptive statistics-I

Course Outcomes:

- To analyse, classify, tabulate and represent the data graphically.
- To compute and interpret various measures of central tendency, dispersion, moments, skewness ,kurtosis, Nature of data.
- Real Life applications of probability and probability distributions.
- Practical work on Excel, R and C

Unit-1 Introduction (10)

1.1 Definition and concept of Statistics, Population and Sample: Concept of statistical population with illustrations, concept of sample with illustrations. 1.2 Methods of sampling: Simple Random Sampling and Stratified Random Sampling (description only). 1.3 Data Condensation: Raw data, Attributes and variables, discrete and

continuous variables, classification and construction frequency distribution. 1.4 Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive curves and their uses. 1.5 Examples and Problems.

Unit-2 Measure of Central Tendency (9)

2.1 Concept of central tendency, Criteria for good measures of central tendency. 2.2 Arithmetic mean: Definition, computation for ungrouped and grouped data, combined mean, weighted mean, merits and demerits. 2.3 Median: Definition, computation for ungrouped and grouped data, graphical method, merits and demerits. 2.4 Mode: Definition, computation for ungrouped and grouped data, graphical method, merits and demerits. 2.5 Quartiles: Definition, computation for ungrouped and grouped data graphical method, Box Plot. 2.6 Numerical problems

Unit-3 Measures of dispersion (9)

3.1 Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion. 3.2 Range and Quartile Deviation: definition for ungrouped and grouped data, and their coefficients, merits and demerits. 3.3 Mean Deviation: Definition for ungrouped and grouped data, minimal property (statement only). 3.4 Standard deviation and Variance: definition for ungrouped and grouped data, coefficient of variation, combined variance and s. d. for two groups, merits and demerits. 3.5 Numerical problems.

Unit-4 Moments, Skewness and Kurtosis (9)

4.1 Raw and central moments: definition for ungrouped and grouped data (only first four moments), relation between central and raw moments (statements only). 4.2 Measures of skewness: Types of skewness. Pearson's and Bowley's coefficients of skewness. Measures of skewness based on moments. 4.3 Measures of kurtosis: Types of kurtosis. Measures of kurtosis based on moments. 4.4 Numerical problems.

Paper – II Probability and Discrete Probability Distributions-I

Unit-1 Probability: (10)

1.1 Idea of permutation and combination, concept of experiments and random experiments. 1.2 Definitions: sample space (finite and countably infinite), events, types of events, power set (sample space consisting at most 3 sample points). 1.3 Illustrative examples. 1.4 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 with reference to finite and countably infinite sample space. 1.5 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) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$ 1.6 Illustrative examples.

Unit-2 Conditional probability and independence of events: (10)

2.1 Definition of conditional probability of an event, examples. 2.2 Partition of sample space, Baye's theorem (only statement) and examples. 2.3 Concept of

independence of two events, examples. 2.4 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. 2.5 Pairwise and complete independence of three events, examples. 2.6 Elementary examples.

Unit-3 Univariate probability distributions (10)

3.1 Definitions: discrete random variable, probability mass function (p.m.f.), cumulative distribution function (c.d.f.), properties of c.d.f., median, mode and examples. 3.2 Definition of expectation of a random variable, expectation of a function of random variable. 3.3 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. 3.4 Definition of mean and variance of univariate distributions. 3.5 Examples

Unit-4 Some standard discrete probability distributions: (8)

4.1 Discrete uniform distribution: p.m.f., mean and variance, examples. 4.2 Binomial distribution: p.m.f., mean and variance, additive property of binomial variates, recurrence relation for probabilities, examples. 4.3 Geometric distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, examples. 4.4 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.

Computer science CC-CS-1303 A
Theory: 60 Hours (75 Lectures) Credits -4
Paper –I Introduction to computers

Specific Objectives:

1) To learn fundamental concepts of computers, inputs, outputs and operating systems.
2) To learn the principles of office automation.
3) To develop logic for problem solving.
4) To teach basic principles of programming.
5) To develop skills for writing programs using 'C'.

Unit --1: Introduction to Computer and Basic Organization (07)

Introduction,History. Characteristics & features of Computers, Components of Computers, Organization of Computer, Generation of Computers, Classification of Computers, Computer Languages, Types of Programming Languages, Machine Languages, Assembly Languages, High Level Languages, Assembler, Linker, Loader, Interpreter & Compiler, Introduction to Computer Virus, how does it spread? Symptoms of it, Types of Virus, Antivirus, Prevention from Virus.

Unit – 2: Input, Output Devices and Concept of Memory (10)

Input Devices : Touch screen , OMR, OCR, Light pen ,Scanners, **Output Devices :** Digitizers, Plotters, LCD, Plasma Display, Printers

Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM
Secondary Storage Devices (FD, CD, HD, Pendrive, DVD, Tape Drive,USB)

Unit – 3: Operating System concepts (10)

Why Operating System, History of operating system, Functions of Operating System, Types of Operating System, Batch O.S.,Multiprogramming O.S.,Time Sharing O.S,Personal Computers O.S., Network O.S.

Unit – 4: MS PowerPoint , MS Excel and MS Access (10)

MS-Power point - Introduction to PowerPoint, Creating a Presentation, PowerPoint views, Slide show,
Formatting slides, Slide transition & adding special effects, Inserting pictures, sound,chart.
MS Excel- modes, Move/Copy text, Insert/Delete Rows and Columns,
Formatting a Worksheet, Print the workbook, Charts, Naming Ranges, and Conditional
Formatting ,Filtering the data from database ,Drawing toolbar, Freeze Panes, Splitting the worksheet.
Goal Seek ,Pivot table and Hyperlinks.Functions: Date and Time function, Statistical
MS Access-Create Tables,data types, Field properties,Validation rules. Create Query,Create Forms, Create Reports.

Paper-II Programming in C-I

Unit –1: Programming Concepts (07)

Program and programming, Programming languages, Algorithm**:** Definition, Examples, Characteristics of an algorithm, Notation of Algorithm, Pseudo code conventions, Flowcharts- Definition, Symbol, features.

Unit-2: Introduction to C (11)

History of 'C', Structure of 'C' program, Program execution phases, Character set and keywords, Constant and its type, Variable and its Data types in 'C', Operators- Arithmetic, logical, relational, bitwise, increment, decrement ,conditional, operator precedence
Programming examples

Unit- 3 Input-Output Statements (07)

Character input-output - getch(), getche(),getchar(),putchar(), String input-output - gets(), puts() , Formatted input-output - printf(), scanf()

Unit-4 Control Structures (13)

Conditional Control Statements –if –if-else –nested if-else –else-if ladder
Multiple Branching Control Statement –switch-case
Loop Control Statements –while –do-while –for –Nested Loops
Jump Control statements –break –continue –goto –exit

Programming examples

CC-CS1303P1 Practical Programming List

1) Demonstration of peripherals
2) Linking of various peripherals
3) Operation of all keys of keyboard
4) DOS – external and internal commands, batch files commands
5) Windows Operating System –Windows explorer, program manager, control panel, print manager, Creating folders, files, icons, shortcuts
6) MS – WORD – Creating new documents, typing, deleting, selecting text, undo, Redo, formatting text – auto format, formatting characters, drop caps, Paragraphs, line spacing, margins, page setup, headers and footers Writer's tools – spelling checker, auto format, auto correct, find and replace Mail merge – Data source, Main document, creating mail merge document.
7) MS – EXCEL - Creating worksheet, Graphs, resizing graphs, formulas, if statement, types of functions
8) MS ACCESS - Creating data bases, writing
queries, deisgn froms and reports.
9) MS Powerpoint – Creating Presentation using various features.

Guidelines Follow standard coding method

- Write Algorithm and draw flow chart neatly
- The output of the program should be neatly formatted
- Practice all the programs in the lab
- Sample Program list

10) Write a program to perform all arithmetic operations on any two numbers.
11) Write a program to check whether given number is even or odd.
12) Write a program to fine largest among three numbers.
13) Write a program to display Fibonacci series.
14) Write a program to find Factorial of Given Number.
15) Write a program to reverse the given number.
16) Write a program to find prime number.
17) Write a program to demonstrate switch statement.
18) Write a program to calculate sum and average of given n numbers using array
19) Write a program to calculate Matrix Addition, Multiplication
20)Write a program to demonstrate pointers.
21)Write a program to swap two numbers using call by value and call by reference.
22)Write a program to find given string is Palindrome or not using function.
23) Write a program that accepts the Roll No, Name, Marks obtained in three tests of 'N' students
and display the total and Average in tabular format.

24) Write a program to separate even and odd numbers available in input file.

25) Write a program to count the no. of words in a given text file.

References

1. Fundamentals of Computers By V. Rajaraman

2. Computers and Common Sense By R. Hunt and Shelly Y.

3. Fundamentals of Computers By P. K. Sinha

4. Andrew S. Tanenbaum, "Modern Operating Systems", 2ndEdition, PHI private Limited, New Delhi,

Semester-II

MATHEMATICS GEC-1300B
Theory: 60 Hours (75 Lectures) credits -4
Paper – I Graph Theory

After completing this course satisfactorily a student will:

1) Be able to apply principles and concepts of graph theory in practical situations .
2) Have a strong background of graph theory which has so many applications in areas of computer Science, Biology, Chemistry, Physics, and Sociology etc.
3) Be able to model real world problems using graph theory.
4) Understand the use of graphs as models.

Unit –1I Graphs & operations on graphs (9)

1.1 Definition and elementary results
1.2 Types of graphs
1.3 Isomorphism
1.4 Matrix representation of graphs : Adjacency matrix and incidence matrix
1.5 Subgraphs and induced graphs
1.6 Complement of a graph, Self complementary graphs
1.7 Union, intersection of graphs, Ring sum of two graphs
1.8

Unit – 2 Connected Graphs (9)

2.1 Definitions : walk, trail, tour, path and circuit
2.2 Definitions of connected, disconnected graphs
2.3 Dijkstra's shortest path algorithm
2.4 Connectivity : Isthumus, cut-vertex, vertex connectivity and edge connectivity

Unit – 3 Tree Graphs (8)

3.1 Tree : Definition
3.1.1 Theorem : A tree with n vertices has n-1 edges
3.1.2 Theorem : A connected graph G with n vertices and n-1 edges is a tree
3.1.3 Theorem : A graph with n vertices is a tree if and only if it is circuit free and has n-1 edges
3.1.4 Theorem : A graph G is a tree if and only if it is minimally connected
3.2 Center of a tree
3.3 Spanning tree : Definition and examples
3.4 Fundamental circuit and cut – set : Definition
3.5 Binary trees and elementary results
3.6 Kruskal's algorithm

Unit –4 Directed Graphs (11)

4.1 Definition, types of directed graphs, vertices
4.2 Isomorphism of digraphs

4.3 Connectedness in digraphs
4.4 Euler digraph
4.5 Network and flows : Definition, examples
4.6 Maximal flow algorithm
4.7 Ford Fulkerson's Maximal flow network algorithm,: Examples

Paper – II Calculus

Upon successful completion of this course students will be able to:

1. Inspect the value of the limit of a function at a point using the definition of the limit.
2. Find the limit of a function at a point numerically & algebraically using appropriate techniques including L'Hospital's rule.
3. Experiment with differentiation of exponential, logarithmic, trigonometric & inverse trigonometric functions n times.
4. Illustrate the consequences of the intermediate value theorem for continuous functions.
5. Show whether a function is differentiable at a point.

Unit –1 Sequences of real numbers (11)

1.1 Sequences of real numbers: definition, examples
1.2 Convergent, divergent, oscillatory sequences, definition & examples
1.3 Bounded sequence : definition & examples
1.4 Monotonic sequences, theorem on monotonic & bounded sequences(statement only)
1.5 Show that $\left\{\left(1+\frac{1}{n}\right)^n\right\}$ is convergent & its limit is 'e'.
1.6 Convergence of sequence $\{x^n\}$, where $x \in R, x > 0$.

Unit – 2 Series of real numbers (9)

2.2 Partial sums
2.3 Convergent, divergent series, definition & examples
2.4 Convergence of geometric series(with proof)
2.5 Comparison test & its limit form (for the series of positive term)
2.6 Convergence of p-series (with proof)
2.7 D'Alembert's ratio test (statement only) & examples
2.8 Root test (statement only) & examples

Unit – 3 Continuity & Mean Value Theorem (11)

3.1 Continuity of a function & its properties defined on [a,b] (properties without proof)
3.2 Differentiability, Differentiability implies continuity but not conversely
3.3 Rolle's theorem (with proof) & its geometric significance & examples
3.4 Lagrange's mean value theorem (with proof) & its geometric significance & examples
3.5 Cauchy's mean value theorem (with proof) & examples

Unit – 4 Successive differentiation **(7)**

4.1 n^{th} derivatives of some standard functions
4.2 Leibnitz's theorem (with proof) & examples
4.3 L'Hospital's Rule(without proof) & examples
4.4 Taylor's & Maclaurin's theorems with Lagrange's forms.
4.5 Taylor's & Maclaurin's series
4.6 Series expansion of e^x,$sin\ sinx$,$cos\ cosx$,$log\ log(1+x)$ etc.

Basic readings

1. Calculus , Nirali Publication
2. A text book of calculus and differential equations by Dinde H. T.

Reference Books:

1. Elements of Discrete Mathematics by C.L.Liu
2. Discrete Mahemaics by Olympia Nicodemi
3. Discrete Mathematical Structure for Computer Science by Alan Doer and K. Levasicur
4. Discrete and combinational Mathematics by R.M.Grassl
5. Discrete Mathematics by Kenneth Rosen, Tata Mc Graw Hill
6. Graph Theory with Applications to Computer Science and Engineering by Narsing Deo, Prentice Hall, India
7. A first step in graph theory by Raghunathan, Nimkar and Solapurkar
8. Discrete Mathematics by S.R.Pail and others, NiraliPrakashan

GEC-1300P1 Paper Title: Laboratory Course Practical – II

11. Kruskal's algorithm
12. Dijkstra's shortest path algorithm
13. Fundamental circuits &cutsets
14. Ford Fulkerson's maximal flow network
15. Rolle's theorem
16. Lagrange's mean value theorem
17. Cauchy's mean value theorem
18. Series expansion of e^x,$sin\ sinx$,$cos\ cosx$,$log\ log(1+x)$
19. L'Hospital's Rule
20. Leibnitz's Rule

Electronics GEC-1301 B

Theory: 60 Hours (75 Lectures) credits -4

Paper-I Analog electronics - II

Course Outcomes:

After the completion of the course the student will be able to:

CO1: Analyze output in different operating modes of Bipolar Junction Transistor and Demonstrate the

operating principle and output characteristics of Bipolar Junction Transistor

CO2: To explain construction and characteristics of JFETs and MOSFETs.

CO3: Design of multistage amplifier and oscillators and Analyze the importance of feedback in amplifiers.

Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

CO4: Understanding various operating modes of Op-amp and its linear/non-linear applications.

Unit1: Bipolar Junction Transistor (10)

Structure and working of bipolar junction transistor: CB, CC, CE configurations, CE mode characteristics, Relation between α and β, DC load line and Q point, potential divider Biasing, Concept of transistor as an amplifier and transistor as a switch.

Unit 2: Field Effect Transistor (08)

Comparison between BJT and FET, classification of FETs, Structure and working of JFET, I-V characteristics and parameters (transconductance, drain resistance, amplification factor) concept of MOSFET-depletion and Enhancement (structure and working only).

Unit 3: Amplifiers and Oscillators (10)

General classification of amplifiers, Idea of Multistage amplifier, different coupling methods (Direct coupling, RC coupling, Transformer coupling) Concept of positive and negative feedback. Barkhausen criteria; Types of oscillators RC phase shift, wein bridge, Hartley, Colpitts oscillator.

Unit 4: Operational Amplifier (10)

Concept of operational amplifier; ideal characteristics of Opamp; Different parameters of Op Amp, Virtual ground concept, Applications of Op-amp: Inverting amplifier, Noninverting amplifier, Unity gain amplifier, Buffer, Adder, Subtractor, Integrator and Differentiator, Comparator, Schmitt Trigger.

Paper-II Digital electronics - II

Course Outcomes:

After the completion of the course the student will be able to:

CO1: Explain and compare the working of multivibrators using special application IC 555. Understanding

and designing of multivibrator circuits.

CO2: Understanding various memories and differentiate them.

CO3: Describe the architecture and functional block diagram of 8085 microprocessor along with pins and

their functions.

CO4: Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different

instructions and apply it in assembly language programming.

Unit 1: Multivibrators (08)

Types of multivibrator, Block diagram of IC 555, Application of IC 555 as Astable and Monastable Multivibrator (Calculation of frequency and Pulse width).

Unit 2: Memory devices and memory Organization (09)

Types of Memory – RAM (SRAM and DRAM), ROM, PROM, EPROM, and EEPROM, Concept of Diode Matrix ROM, Memory organization - building the required memory size by using available memory chips, memory address map.

Unit 3 Introduction to Microprocessor (10)

Introduction to microprocessors (8, 16, 32 Bits). Pin Diagram and Architecture of 8085. Pin Diagram and Architecture of 8086.

Unit 4 Instruction Set and Programming of 8085 Microprocessor (10)

Instruction Set of 8085, Assembly Language Programs (ALP) for Addition, Subtraction, Multiplication, Division, Data transfer, Block Transfer.

RECOMMENDED BOOKS:

1. Principles of Electronics:	A.P. MALVINO, (TMH)
2. A text Book of Applied Electronics	R. S. Sedha(S chand Publication)
3. Electronic Devices and Circuits	Allen Mottershead (PHI)
4. Principles of Electronics	V.K. Mehta (New Edn.)
5. Basic Electronics and Linear Circuit	N.N. Bhargava, D.C. Kulshreshtha, S.C. Gupta(TMH)
6. Fundamentals of Digital Electronics;	Anand Kumar PHI Publications 2001
8. Digital Principles:	T.L Floyd 3rd edition
9. Modern digital Electronics;	R.P Jain, Tata Mc-Graw Hill Publication

GEC-1301P1 Electronics -Lab- I and II

Analog Electronics

1. Study of Positive & Negative Voltage regulators using three pin IC's.
2. Study of Kirchhoff's Laws.
3. To verify Thevenin, Norton theorem for a resistive circuit.
4. To verify Superposition, Maximum Power Transfer theorem for a resistive circuit.
5. Study of forward, reverse characteristic of rectifier diode.

6. Study of CRO.
7. Transistors as switch (Application for LED & Relay).
8. Study of full wave rectifier with & without filter (calculation of ripple).
9. Transistor characteristics (CE) configuration.
10. RC phase shift oscillator.
11. Study of Hartley/ Colpitts Oscillator.
12. Study of Op Amp as adder and subtractor.
13. Study of Op Amp as Differentiator and Integrator.
14. Study of Characteristics of JFFT.
15. Study of Zener Diode as a voltage regulator.

Digital Electronics

1. Study of Basic gates.
2. Universal building block using NAND and NOR gates.
3. Verification of De-Morgan's Theorems.
4. Study of Flip-Flops (D & JK).
5. Study of Half & full adder.
6. Study of Half & full subtractor.
7. Study of Flip Flop: RS, Clocked RS, D.
8. Study of Astable Multivibrator circuit using IC 555.
9. Study of Monostable Multivibrator circuit using IC 555.
10. Study of Multiplexer and De-Multiplexer.
11. Arithmetic Operation using uP8085 – I.
12. Arithmetic Operation using uP8085 – II.
13. Block transfer using uP8085.
14. Block Exchange using uP8085.
15. Study of Encoder and Decoder.

At least 12 experiments from each group.

Statistics GEC-1302 B
Theory: 30 Hours (37 Lectures) Credits -4
Paper – I Descriptive statistics-II

Unit-1 Correlation (for ungrouped data) (10)

Correlation (for ungrouped data) (09) 1.1 Concept of bivariate data, scatter diagram. Concept of correlation, positive correlation, negative correlation, cause and effect relation. 1.2 Karl Pearson's coefficient of correlation, properties of correlation coefficient, interpretation of correlation coefficient. 1.3 Spearman's Rank Correlation coefficient (formula with and without ties). 1.4 Numerical problems.

Unit-2 Regression (for ungrouped data): (10)

2.1 Concept of regression. Derivation of lines of regression by method of least squares. 2.2 Regression coefficients and their significance. Properties of regression coefficients. 2.3 Point of intersection and acute angle between regression lines (without proof). Unit-3 2.4 Numerical problems.

Unit-3 Multiple, partial Correlation & Regression (For Trivariate Data): (10)

3.1 Concept of multiple regressions. Yule's Notations. 3.2 Residual: definition, order, properties, mean and variance of residual. 3.3 Fitting of multiple regression planes(without proof). Partial regression coefficients, interpretations. 3.4 Concept of multiple correlation. Definition of multiple correlation coefficient and its formula. 3.5 Properties of multiple correlation coefficient (statements only) 3.6 Interpretation of multiple correlation coefficient when it is equal zero and one. 3.7 Concept of partial correlation. Definition of partial correlation coefficient and its formula. 3.8 Properties of partial correlation coefficient. 3.9 Examples and problems

Unit-4 Time Series (7)

Series: (08) 4.1 Definition and Uses of Time Series, Components of time series, 4.2 Methods of determination of trend. Method of Moving Averages, Method of Least Squares (only for straight line). 4.3 Determination of Seasonal Variations by Simple Average Method.

Paper – II Continuous Probability Distributions and Testing of Hypothesis

Unit-1 Continuous Univariate Distributions (10)

1.1 Definitions: infinite sample space with illustrations, continuous random variable, probability density function (p.d.f.), cumulative distribution function (c.d.f.), properties of c.d.f. 1.2 Expectation of random variable, expectation of function of a random variable, mean, variance and examples. 1.3 Uniform distribution: p.d.f., c.d.f., mean, variance and examples. 1.4 Exponential distribution: p.d.f., c.d.f., mean, variance, lack of memory property and examples. 1.5 Normal distribution: p.d.f., standard normal distribution, properties of normal curve, distribution of aX+bY, where X and Y are independent normal variates, normal distribution as a limiting case of Binomial and Poisson distributions (without proof), examples.

Unit-2 Exact sampling distributions: (10)

2.1 Chi-square distribution: definition, chi-square variate as the sum of square of i.i.d. S.N.V., statement of p.d.f., mean, variance, additive property, approximation to normal distribution and examples. 2.2 Student's t-distribution: definition, nature of probability curve, State mean and variance, approximation to normal, examples. 2.3 Snedecor's F-

distribution: definition, State mean and variance, inter-relationships between chi-square, t and F distributions, examples.

Unit-3 Testing of hypothesis (10)

3.1 Definitions: random samples, parameter, statistic, standard error of a statistic. 3.2 Concept of null and alternative hypothesis, types of error, critical region, level of significance, one sided and two sided tests, general procedure of testing of hypothesis,. 3.3 Large sample tests for: i) population mean, ii) Population proportion. 3.4 Small sample tests: i) Test for population variance, Chi-square test for goodness of fit and test for independence of attributes using 2×2 contingency table, ii) t-test for testing population mean. iii) F test for equality of two population variances. 3.5 Examples.

Unit-4 Simulation: (8)

4.1 Introduction to simulation, merits and demerits. 4.2 Pasedo-random number generator, model sampling from uniform and exponential distribution. 4.3 Model sampling from normal distribution using Box-Muller transformation. 4.4 Examples.

GEC-1302P1 Laboratory Course in Computer Science

Statistics Practical: List of Statistics experiments to be performed

1) Construction of frequency distributions and graphical methods.
2) Measures of Central tendency (Ungrouped data)
3) Measures of Central tendency (Grouped data)
4) Measures of dispersion (Ungrouped data).
5) Measures of dispersion (Grouped data).
6) Moments, skewness, kurtosis (Ungrouped data).
7) Moments, skewness, kurtosis (Grouped data).
8) Fitting of Binomial & Geometric distribution.
9) Fitting of Poisson distribution.
10) Model sampling from Binomial & Geometric distribution.
11) Model sampling from Poisson distribution.
12) Computation of correlation coefficient and scatter diagram.
13) Fitting of lines of regression (Ungrouped data).
14) Fitting of regression planes and estimation & computation of partial and multiple correlation coefficients.
15) Time Series
16) Fitting and sketch of Uniform distribution.
17) Fitting and sketch of Exponential distribution.
18) Fitting and sketch of Normal distribution.
19) Model sampling from Normal distribution using : i) Normal table and ii) Box-Muller transformation.
20) Model sampling from Uniform distribution and Exponential distribution.

Note: i) For the experiment numbers 16, 17 and 18 it is expected to sketch both observed and expected frequency distributions on the same graph.
ii) Test of goodness of fit is necessary for every practical on fitting of distributions.
iii) All the practical's are to be done on computers using MS-EXCEL, Using R, Using C.
iv) Calculations (observation table) should be done by using Statistical formulae.
v) Computer printout is to be attached to the journal.
vi) Student must complete the entire practical to the satisfaction of the teacher concerned.
vii) Student must produce the Laboratory Journal along with the completion certificate signed by the Head of the department, at the time of practical examination.

Books Recommended:-

1. Fundamentals of Statistics by Goon, Gupta, Das Gupta.
2. Statistical Methods by S. P. Gupta.
3. Business Statistics by S. Saha.
4. Modern Elementary Statistics by J.E. Freund.
5. Fundamental of Statistics by S.C.Gupta.
6. Fundamentals of Mathematical Statistics by Gupta and Kapoor.
7. Statistical Methods (An introductory text by J. Medhi)
8. Probability and statistics with reliability queuing and computer science applications by K. S. Trivedi.
9. Fundamental of mathematical statistics by Gupta and Kapoor.

Computer science –CC-CS-1303 B
Theory: 60 Hours (75 Lectures) Credits -4
Paper- I Introduction to computers

Specific Objectives:

1. Define the basics in web design
2. Visualize the basic concept of HTML.
3. Recognize the elements of HTML.
4. Introduce basics concept of CSS.
5. Develop the concept of web publishing
6. To know the concept of array and functions.
7. Implement pointers and structures
8. To know file handling

Unit– 1: Computer Network Basic Concepts (10)

Basic elements of communication systems.-Sender,receiver and medium, Data Transmission Modes- Simplex,Half Duplex,Full Duplex, Data Transmission Media-Twisted pair, Coaxial cable,Microwave ayaten,satellite, Definition Networking,Features of Networking., Types Of Networking,Network Topologies.

Unit – 2: Introduction to HTML (07)

HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Unit –3: Images, Tables Frames, Image Maps, Forms in HTML (10)

Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit –4: Introduction to Cascading Style Sheets (10)

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

Paper-II Programming in C-II

Unit-1 Arrays and strings (06)

- Array –One dimensional arrays –Declaration of 1D arrays –Initialization of 1D arrays –Accessing element of 1D arrays –Reading and displaying elements
- Two dimensional arrays –Declaration of 2D arrays –Initialization of 2D arrays –Accessing element of 2D arrays –Reading and displaying elements
- Initializing strings,Reading string
- string handling functions (strcpy(), strcmp(), strcat(), strlen(), strrev())
- Programming Examples

Unit-2 Function (12)

- What is function? Advantages of using functions, Function Prototype –Defining a function, Calling a function ,Return statement ,Types of functions ,Recursion, Local and global variables
- Programming Examples

Unit-3 Pointer, dynamic memory allocation and Structure (15)

- Def of Pointer, Declaration of Pointer Variables, Assigning Address to Pointer Variables ,De-referencing Pointer Variables, Pointer Arithmetic –Pointer comparisons –De-reference and increment pointer –Null pointer , Parameter Passing Techniques –call by value, call by address, malloc() –calloc() –realloc() . –free()
- Programming Examples
- Why is structure used? What is structure? Advantages of structures, Defining a Structure , Declaration of Structure Variables , Initialization of Structure Variables , Accessing Structure Members ,Storage of Structures in Memory ,Size of Structures, Reading and Displaying Structure Variables , Assignment of Structure Variables , Pointers to structures, Array of structures , Arrays within structures , Nested structures , Self-referential structures
- Programming Example

Unit-4 File Handling **(5)**

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()

CC-CS1303P1 Practical Programming List

1. Write HTML code to develop a web page for giving details of your name, age, address. It contains the different background and foreground color, with different attribute of Font tags like italic, bold, underline etc. and give suitable heading style.
2. Write HTML code to create a WebPages that contains an Image at its left hand side of the page when user clicks on the image; it should open another web page that displays the details of that image.
3. Create a web Page Practicing Hyper linking of webpages ,ALINK, VLINK etc.
4. Create a web page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.
5. Create a HTML document containing a nested list showing the content page of any book.
6. Create a web page which should divide a page into two equal frames & 3 Frames
7. Design a form using all input types
8. Acquaintance with creating style sheet, CSS properties and styling.
9. Working with Background, Text and Font properties.
10 Working with HTML elements box properties in CSS
11. Working with Positioning and Block properties in CSS
12. Designing with cascading style sheet-Internal style sheet & External style sheet
13. Write a program to print the size of all the data types in C and its range.
14. Write a program to convert Fahrenheit to Celsius.
15. Write a program to check whether the given number is a Prime number or not.
16. Write a program to accept three numbers and find the largest and second largest
17. Write a program to print all prime numbers between any 2 given limits.
18. Write a program to print all the Armstrong numbers between any 2 given limits.
19. Write a program to check whether the string is a Palindrome.
20. Write a program to check whether a given matrix is an Identity matrix or not.
21. Write a program to perform matrix multiplication.
22. Write a program to count the different vowels in a line of text.
23. Write a program to accept two numbers and perform various arithmetic operations (+, -, *, /) based on the symbol entered.
24. Write a program to find the roots of a quadratic equation
25. Write a recursive program to find the factorial of a number.
26. Create an employee structure and display the same.
27. Write a function to swap two numbers using pointers .

28. Write a program to access an array of integers using pointers.
29. write a program to implement file handling.

References

1.The complete reference HTML & CSS by T.A. Powell (TMH Publication)
2. HTML, DHTML, JavaScript, Perl CGI by IVAN Bayroos (BPB Publication)
3. HTML 5 Step by Step, Faithe Wempen, Prentice Hall of India Private Limited, New Delhi
4. Beginning HTML, XHTML, CSS, and JavaScript, John Duckett, Wiley India
5.Computer Networks‖ Andrew S.Tanenbaum , David J.Wetherall, Fifth edition, Pearson Education , 2011