B.Sc. Computer Science Entire Part-I
Computer Science (Semester I & II)

Title of the Course	Computer Science
Year of Implementation	Revised Syllabus will be implemented from June 2018 0nwards.
Duration	Part- I shall be of one academic year consisting of two semesters.
Pattern	Semester Pattern

STRUCTURE OF THE COURSE

Code	Paper	Name of the Paper	Marks
Computer Science Semester -I			
CC101	Paper-I	Fundamentals of Computer	50
CC102	Paper-II	Programming in C Part-I	50
Computer Science Semester -II			
CC201	Paper-III	Linux Operating System	50
CC202	Paper-IV	Programming in C Part-II	50
Practical (Annual)			
Lab Course	Papers II, III & IV	Lab Course- I (CC-102, 201& 202)	100

EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED CBCS SYLLABUS)

Sr. No	Title of old paper	Sr. No	Title of New paper
SEMESTER -I			
1	Introduction to Computer and Data Processing Part-I	**1**	Fundamentals of Computer
2	Introduction to Programming Using C part-I	**2**	Programming in C Part-I
SEMESTER -II			
3	Introduction to Computer and Data Processing Part-II	**3**	Linux Operating System
4	Introduction to Programming Using C part-II	**4**	Programming in C Part-II
Practical (Annual Pattern)			
5	Lab course in Computer science- I	**5**	Lab Course -I
6	Lab Course in Computer science -II		

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: DSC-101: Computer Paper-I
Course Title: Fundamentals of Computer

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Introduction to Computer System** • Introduction, Definition, Characteristics and Block diagram of Computer. • Limitation and advantages of computer. • Types of computers: Mini Computer, Micro Computer, Mainframe and Super Computers, Laptop and Tablet. • Computer Languages: Machine Language, Assembly Language, High Level Languages. • Translators- Assembler, Complier and Interpreter • Primary and secondary storage devices. Primary Storage Devices: RAM ROM, PROM and EPROM. Secondary Storage Devices: CD, DVD, Portable Hard Disc & Pen Drive.	18
2	**Computer Hardware and Software** • Introduction of Hardware • Input Devices: Keyboard, Scanner, OCR, MICR. • Output Devices: Printer and its types, Plotter, Monitor- LCD, LED and OLED Displays. • Pointing Devices: Mouse, Joystick, Touch Screen • Types and working of Hardware Parts – Motherboard, Ports, HDD, CPU & SMPS. • Types of buses-Address bus, Data bus. • Definition of Software. • Types of Software: System Software and Application Software. • Computer Codes- BCD, EBCDIC, ASCII, Gray Code, Excess 3- code. • Basic Input and Output Settings (BIOS), Network Interface Card (NIC) , Graphic Card. • Network protocols-HTTP, FTP, TCP/IP. .	18

Reference Books

1. Computer Today –Basandara
2. Fundamentals of Computers --V. Rajaraman.
3. Computer Fundamentals – By P .KSinha

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: DSC-102: Computer paper-II
Course Title: Programming in 'C' Part-I

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Planning the Computer Program** • Concept of Problem solving, Problem definition, problem analysis, Algorithms and flow chart, Debugging, Types of errors in programming, Documentation, • Basics of Linux Operating System(Ubuntu) and 'C' programming language • Introduction to GCC Compiler, • Data Types, Variable Declaration, Input/output Statement, Built-In Standard Library, Nitty-Gritty of Program, C Program Structure, Vim Editor, Whittling the First 'c' Program, Compilation and Execution Program, Format Specifiers, Escape Sequences. • **Branching Statements** -Introduction, if statement, if-else statement, Nested If-else,Switch case statement.	**18**
2	**Looping Statements and Array** • Definition of Loop. • Types of looping statement-(for, while, do—while) • Difference between while loop and do—while Loop, • Loop control Statement (break, continue),. • Infinite Loop. • Definition and declaration of array. • Features of Array • Initialization of array • Memory representation of array. • Types of Arrays • Single Dimensional Array, • Two Dimensional Array, • String Functions- Predefined	**18**

Reference Books

1. The C Programming Language - By Brian W Kernighan and Dennis Ritchie
2. C programming in an open source paradigm:– By R. K. Kamat, K . S. Oza, S.R. Patil
3. The GNU C Programming Tutorial -By Mark Burgess
4. Let us C- By Yashwant Kanetkar

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: DSC-201: Computer Paper-III
Course Title: Linux Operating System

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 Teaching Scheme: Theory – 03 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
1	**Introduction to Operating System** • Definition of Operating System • Need and Functions of Operating System • Operating Systems: basics of Unix. • Introduction to Linux • Comparison of Linux with Windows operating system. • Architecture of Linux • Login, Logout, Shell, Kernel, GPU Commands (cal, date, whoetc) • Directory management(mkdir, cd, rmdir) • File handling using Linux commands, • commands –ls, cat,cp,mv,rm , • Types of files, • chmod command, • Basic filter- head, tail,sort,grep • Creating files using VI editor, • Handling command mode, insert mode and ex mode.	18
2	**Shell Programming and Internet** • Concept of Shell scripting, • Conditional statements-if, if else, case. • looping-for, while, until, • Continue and break statement. • read, echo statement, • Writing and executing shell script • Introduction to Internet • History of Internet • Internet Protocol(SMTP,POP,IMAP) • Introduction to different Web browsers, • Concept of Email, component of email • Working with email (Compose e-mail, Send e-mail, File attachment, . Uploading & downloading.)	18

References Book-

1. Operating System Concepts – Silberschatz, Galvin and Gagne
2. Operating System By Godbole
3. Linux Bible 9th Edition by Christoper Negus ISBN :978-1-118-99987-5
4. Ball, Using Linux, PHI, 1998. ISBN-10: 0789716232
5. UNIX: Concepts and Applications Das (4th Ed), TMH, 2006 ISBN 13: 9780070635463

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: DSC-202: Computer Paper-IV
Course Title: Programming in 'C' Part-II

Total Contact Hours: 36 hrs (45 lectures of 48 minutes)

Credits: 02 Teaching Scheme: Theory – 03 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
1	**Functions and Pointer** • Definition, declaration, prototype of function • Local and global variable, • User defined functions • Recursion, Storage classes. • Pointer Definition and Declaration, • Pointer Initialization, • Pointer arithmetic. • Arrays of Pointers, • Pointers and One andtwo dimensional Arrays, • Call by value and call by reference • Dynamic Memory Allocation	18
2	**Structures, Union and File Handling** • Definition and declaration of structure, • Nested Structure, Array of structures, structure pointer, • passing structure to function, self- referential structure, • sizeof() and typedef Keyword. • Definition and declaration, of union • Difference between Structure and Union • Concept of File,Text and binary mode files, Opening and closing files-fopen() and fclose(), • File opening mode- read, write, append ,reading and writing character and string function(getc(), putc() , getw() , putw() ,gets(),puts()), Formatted input- scanf(), sscanf(), fscanf(), fread(), Formatted output- printf(),sprintf(), fprintf(), fwrite(). • Functions-fseek(), ftell(), fflush(), fclose(), rewind().	18

Reference Books

1. The C- Programming Language - By Brian W Kernighan and Dennis Ritchie
2. C- Programming in an open source paradigm:– By R.K.Kamat, K .S.Oza, S.R. Patil
3. The GNU C Programming Tutorial -By Mark Burgess
4. Let us C- By Yashwant Kanetkar

Lab Course –I (Based on CC-102, 201and 202)

Practical on 'C' using Ubuntu Linux Operating System

1. Write a program to accept 5 subject marks and calculate total marks, percentage and grade of student.
2. Write a program to input a number and find the given number is Odd or Even.
3. Write a program to input the day number and display day of week.
4. Write a program to find the sum of first n natural numbers.
5. Write a program which display following output-
   A B C D E
   A B C D
   A B C
   A B
   A
6. Write a program to accept the range and generate Fibonacci Series.
7. Write a program to find given number is Armstrong or not.
8. Write a program to find prime numbers between given range
9. Write a program to sort the numbers in ascending and descending orderusing array.
10. Write a program to add two Matrices; Use two Dimensional arrays
11. Write a program to find the product of given two matrices.
12. Write a function which adds three number and display output on the screen.
13. Write a function which calculate cube of given number.
14. Write a program which swap two number using a) call by value and b) call by reference.
15. Write a program which create student structure which accept student rollno ,student name, address ,subject marks ,percentage and display same on screen.
16. Write a program to separate even and odd numbers available in file.
17. Write a program to count the no. of words in a given text file.
18. Write a program to remove blank lines from a file.
19. Write a program to copy content of one file into another file.
20. Write a file handling program which accept student information store it into disk file using binary mode.

Practical on Linux

1. Starting and Stopping Linux: Booting a Linux System, Shutting Down a Linux System,.
2. Demonstration of Linux commands with attributes: - pwd, cd, ls, echo, clear, kill, ps, man, cal, date, who, who am I, wc, mkdir, rmdir, rm, sort.
3. Creation of Files, and changing their permission using chmode command.
4. Write a shell script which check given number is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified range of months.
6. Write a shell script which display date in the mm/dd/yy format.
7. Write a shell script which check given number is positive or not.

8. Write a shell script to display the multiplication table of given range ,
9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to find the LCD (least common divisor) of two numbers.
11. Write a shell script to find the factorial of a given number.
12. Study information of Modem, IP address, Hub, and Switch on Internet
13. Study different web Browsers of internet.
14. Create your E-Mail ID and send an E-mail.
15. Login through your E-Mail ID and do the following:. Read your mail Compose a new Mail , Send the Mail to one person , Send the same Mail to various persons ,Forward the Mail. ,Delete the Mail ,Send file as attachment

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B.Sc. Computer Science Entire Part-I
Electronics (Semester I & II)
Syllabus to be implemented from June 2018 onwards

Title of the Course	Computer Science
Year of Implementation	Revised Syllabus will be implemented from June 2018 0nwards.
Duration	Part- I shall be of one academic year consisting of two semesters.
Pattern	Semester Pattern

STRUCTURE OF COURSE

Code	Paper	Name of the Paper	Marks
Electronics Semester -I			
GEC-103	Paper- I	Electronics Devices and Circuits-I	50
GEC-104	Paper-II	Digital Electronics-I	50
Electronics Semester -II			
GEC-203	Paper-III	Electronics Devices and Circuits-II	50
GEC-204	Paper-IV	Digital Electronics-II	50
Practical (Annual)			
Lab Course	Paper I to IV	Electronics Practical I & II (GEC-103, 104, 203 & 204)	100 (50+50)

EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED CBCS SYLLABUS)

Sr. No.	Title of old paper	Sr. No.	Title of New paper
SEMESTER I			
1	Electronics Devices and Circuits-I	1	Electronics Devices and Circuits-I
2	Digital Electronics-I	2	Digital Electronics-I
SEMESTER – II			
3	Electronics Devices and Circuits-II	3	Electronics Devices and Circuits-II
4	Digital Electronics-II	4	Digital Electronics-II
Practical Annual Pattern			
5	Electronics Practical I & II	5	Electronics Practical I & II

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: GEC-103: Electronics Paper-I
Course Title: Electronics Devices and Circuits-I

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**A) Liner components in computer** • **Resistors** : Classification, construction of carbon composition resistor only, color code method, specifications of resistors. • **Capacitors** : Classification, construction of electrolyte capacitor only, finding value of capacitor using number, specifications of capacitors. • **Inductors** : types of inductors, its applications, • **Transformers** :Types of transformers , (voltage, current) step-up, step down transformer and its specifications • Types of switches, Construction and working of electromechanical relay • Types of cables (Coaxial, twisted pair, optical fiber), comparison of cables. **B) DC circuit analysis** • Concept of ideal & practical voltage and current source, internal resistance etc. • Ohm's law, Kirchhoff's current and voltage law ,voltage –current divider rules. • Application of Kirchhoff's laws to simple circuits. • Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum power transfer theorem, (only statement and examples)	**18**
2	**A) Semiconductor Diode** • P-N junction diode :Formation of Depletion Layer , • Forward and reverse bias characteristics • Zener diode & its parameters ,Photodiode- LED (construction & working), • Varactor diode, solar cell , Qualitative idea of Schottky diode • Applications- Opto-coupler, dot matrix display of LED, 7 segment display **B) Bipolar Junction Transistors** • Symbol, types, construction**,** Structure and working • CB,CC, CE configurations & comparison • CE mode Input- Output characteristics, Relation between α and β • DC load line & Q point. Factors affecting the Q stability & potential divider biasing • Concept of transistor as an amplifier and transistor as a switch • Application – Amplifier, switch, photo- switch circuit (using photo-diode, transistor, relay)	**18**

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: GEC-104: Electronics Paper-II
Course Title: Digital Electronics-I

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**A) Number Systems & Binary Codes** • Introduction to Decimal, Binary, Hexadecimal Number system • Interconversion from one system to Another (examples) • BCD code, Gray code, Exess-3 code, ASCII code, EBCDIC code • Concept of parity bit ,Signed and unsigned numbers representation • 1's & 2's complement of binary numbers, 9's complement and binary arithmetic. • Hamming code for error correction & detection **B) Logic Gates** • AND, OR, NOT, NOR, NAND, EX-OR (Symbol, Expression and Truth Table) • Application of EX-OR gate , Boolean algebra and identities • De Morgan's theorem and Inter conversion of logic Gates (NAND and NOR) • Simplifications of logic expressions using - a) *Boolean algebra b) K- map* (using SOP format upto 4 variables) with examples • Introduction to logic families (TTL, ECL, CMOS), TTL NAND gate & CMOS NOT gate • Input output parameters – Logic levels, switching speed, propagation delay, power dissipation, noise margins and fan in-out of TTL and CMOS • Tristate logic (inverter & buffer)	**18**
2	**A) Combinational Circuits** • Introduction, Half adder, Full adder, Half & Full Subtractor, Parallel adder, Universal Adder & Subtractor • Encoder (decimal-BCD), priority encoder, Decoder (BCD-Decimal), 3x4 matrix keyboard encoder , Multiplexer and De-multiplexer (upto 8:1 & 1:8) • Study of IC 74153, 74151,7447,74138 ,74139,74148 etc.(only up to features) for practical's only **B) Sequential Circuits** • Concept of sequential circuits ,Flip-flops : RS, Clocked RS, Latch, D(edge triggered), JK, Master-Slave JK in detail (including advantages, drawbacks & applications) PRESET & CLEAR in Flip-flop • Counter-synchronous, asynchronous (up to 4-bit) ,up-down counter (3-bit) • Modulus-N counter, applications of counter ,Construction of mod-5, mod-10 counter • Shift Register: SISO,SIPO,PISO,PIPO, Ring counter, Johnson counter (4-bits) Study of IC 7495,7490 (up to features) for practical's only.	**18**

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: GEC-203: Electronics Paper-III
Course Title: Electronics Devices and Circuits -II

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**A) Field Effect Transistors** • Structure and working of: JFET I-V characteristics and parameters (trans-conduction, drain resistance, pinch of voltage, amplification factor) • MOSFETS (types, construction ,characteristics and applications) • Applications: FET as-Voltage Variable resistance (V V R), inverter, switch, memory cell, DRAM, Comparison of BJT-FET- MOSFET. **B) Amplifier & Oscillators** • Classification of amplifier (based on frequency response and Q point) • Single stage amplifier & Need of Multistage amplifier , • Coupling Scheme : (Direct, RC, Transformer coupling in detail) (only circuits using transistors and freq response) • Class A,AB, B,C amplifier study (only from Q point location) • Concept of positive and negative feedback (with Af equations) (only equations, no mathematical analysis) • Conditions for sustained oscillations (Barkhausen criterion) • RC- phase shift, LC- Colpitt's & crystal oscillator (construction & working, no mathematical analysis, formula only), Applications of oscillators.	18
2	**A) Operational Amplifiers** • Concept of Differential amplifier, study of IC 741. • Concept of operational amplifier (block diagram), pin diagram of IC 741, Ideal & practical characteristics /& parameters of Op. amp • Linear & Nonlinear applications of op.amp.- inverting amplifier Virtual ground, sign changer, non-inverting amplifier, • Unity gain amplifier, buffer, adder, Subtractor, integrator and differentiator. • Comparator (zero & non-zero crossing detector) • Phase shift oscillator using op.amp., Schmitt trigger using op.amp. • Uploading & downloading.) **B) Power Supplies** • Rectifier, Working of rectifier (Half, Full, Bridge) in detail & comparison (Without mathematical analysis). • Filter circuits & types (study of C & LC filter only) • Concept of RC High pass & Low pass Filters • Concept of regulation: Line & Load ,Zener as regulator , • 3-pin positive and negative voltage regulator, SMPS –block diagram & working . UPS: ON-line & OFF-line (block diagram and different parameters)	18

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: GEC-204: Electronics Paper-IV
Course Title: Digital Electronics-II

Total Contact Hours: 36 hrs (45 lectures of 48 minutes)

Credits: 02 Teaching Scheme: Theory – 03 Lect. / Week Total Marks: 50

Unit	Contents	Hours Allotted
1	**A) Multivibrators** • Concept & Types of multivibrator , Pin & block diagram of IC 555 • Application of IC 555: Astable (duty cycle & frequency) Monostable (pulse width calculation) , Bistable (switching of states) • Crystal clock generation using (single & multi) inverter • Clock generation using NAND/NOR gate **B) Memory devices** • Classification & Types of Memory – volatile and nonvolatile • SRAM and DRAM (using BJT & MOSFET) • Concept of Diode Matrix ROM, PROM, EPROM, & EEPROM, Flash memory. • Design main memory from given RAM/ROM size • Speed ,capacity and cost range/relation of memory devices	18
2	**A) Introduction to Microprocessors** • General block diagram, Introduction & evolution of Micro-processors (4, 8, 16, 32….. Bits) • Features ,Pin Diagram and Architecture of 8085 in detail • Features & Brief Architecture of 8086 (no pin diagram) **B) Instruction Set of 8085 & Programming** • Instruction format ,T-state, Instruction Cycle, Machine Cycle, • Addressing modes ,Instruction Set of 8085 , • ALP 's for Data transfer, Addition, Subtraction, Multiplication, Division, Block Transfer & Exchange operations.	18

Reference Books

For Papers GEC 103 & 203

1. Principles of Electronics : A.P. MALVINO, Tata Mc-Graw Hill Publication, 7 Edition.

2. A text Book of Applied Electronics R.S. Shed, S chand Publication

3. Electronic Devices and circuits by S. Rama Reddy, Narosa publication Dheil

4. Principles of Electronics : V.K. Mehets, S.Chand & Company Ltd.

5. Basic Electronics and Linear Circuits : N.N. Bhargava, D.C.Kulshreshtha, S.C. Gupta TMH

6. Electronic Devices and ciruits : Boyistead, Tata Mc-Graw Hill

7. Operational Amlifiers By Ramakant G

For Papers GEC 104 & 204

1. Digital principals and applications; Malvino Leach, Tata McGraw Hill,4th Edition

2. Fundamentals of Digital Electronics: A. Anand Kumar PHI Publication 2001

3. Digital principals: T.L. Floyd 3rd edition

4. Digital Electronics: C.F. Strangio

5. Modern digital Electronics: R.P. Jain, Tata McGraw Hill Publication

6. Digital logic and computer design – Morris Mano

7. First course in Digital System Design: John P. Uyemura, Brooke/ColeThompson Learning (2001)

Practical: GEC 103& 104

(Group – A) At least 12 experiments from the following Besides # 1

1. Study of general Electronic components & measurement of Amplitude, Frequency & Phase using CRO.
2. Verification of Kirchhoff's Laws.
3. Verification of Thevenin's Theorem.
4. Positive & Negative Voltage regulators using 3 in IC's
5. Transistors as switch (Application for LED & Relay)
6. Study of full wave rectifier with & without filter (calculation of ripple)
7. Adder & Subtractor using 741.
8. Study of PN diode Characteristics (forward Si & Ge)
9. Transistor Characteristics in CE (calculation of beta & alpha)
10. Characteristics of JFFT calculation of parameters
11. Study of crystal oscillator using transistor / gate
12. Design, built and Study Low pass and High pass RC filters
13. Study of Zener diode as a Regulator.
14. Phase shift oscillator using op.amp.
15. Study of Inverting & Non-inverting amplifier using 741.

Practical: GEC 103,104 *Group –B*

At least 12 experiments from the following

1. Study of Logic gates
2. Universal building block (NAND & NOR)
3. Verification of De-Morgan's Theorems
4 Study of Flip-Flops (RS, D & JK)
5. Half adder-Subtractor
6. Full Adder-Subtractor (using 7483,7404)
7. IC 555 as Astable Multivibrator
8. IC 555 as Monostable Multivibrator
9. Study of Shift Register (IC 7495)
10. Multiplexer /Demultiplexer using IC's
11. Study of 4 bit parity checker/ generator using X-OR gate
12. Study of Counter using IC 7490
13. Study of single digit counter.(using 7447,7490)
14. Arithmetic operations using 8085 kit or simulator
15. Block transfer/exchange using 8085 kit or simulator

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B.Sc. Computer Science Entire Part-I
Mathematics (Semester I & II)

Syllabus to be implemented from June 2018 onwards

Title of the Course	Mathematics
Year of Implementation	Revised Syllabus will be implemented from June 2018 0nwards.
Duration	Part- I shall be of one academic year consisting of two semesters.
Pattern	Semester Pattern

STRUCTURE OF THE COURSE

Code	Paper	Name of the Paper	Marks
Mathematics Semester -I			
GEC - 105	Paper-I	Discrete Mathematics	50
GEC - 106	Paper-II	Algebra	50
Mathematics Semester -II			
GEC - 205	Paper-III	Graph Theory	50
GEC - 206	Paper-IV	Calculus	50
Practical (Annual)			
Lab Course	Papers	Practical - I & II	100

EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED CBCS SYLLABUS)

Sr. No	Title of old paper	Sr. No	Title of New paper
SEMESTER -I			
1	Discrete Mathematics	**1**	Discrete Mathematics
2	Algebra	**2**	Algebra
SEMESTER -II			
3	Graph theory	**3**	Graph theory
4	Calculus	**4**	Calculus
Practical (Annual Pattern)			
5	Mathematics Practical I & II	**5**	Mathematics Practical I & II

B. Sc. Part- I Computer Science Entire (Semester I)

Course Code: GEC-105: Mathematics Paper-I

Course Title: Discrete Mathematics

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Counting Principles** • Functions : Definition, Types of mapping , Injective, Surjective & Bijective functions, Inverse function, Composition of functions • 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	12
2	**Recurrence Relations** • Introduction • Linear Recurrence relation with constant coefficient • Homogeneous solutions and Examples • Particular and Total Solution, Examples	12
3	**Logic** • Propositions and Logical connectives: Definition, Types of Propositions, Truth values and Truth Tables, Tautology and Contradiction, Logical equivalence • Rules of inferences • Valid arguments and proofs • Methods of Proofs : Direct and indirect Examples	12

Reference Books

1 Elements of Discrete Mathematics by C.L. Liu

2 Discrete Mathematics by Olympia Nicodemi

3. Discrete Mathematical Structure for Computer Science by Alan Doer and K.Levasicur.

4. Discrete and Combinatorial Mathematics by R.m. Grassl

5. Discrete Mathematics by Kenneth Rosen,Tata McGraw Hill

6. Discrete mathematics by S.R.Patil and others, NIRALI Prakashan.

7. Discrete mathematics by Bhopatkar, Nimbkar, Joglekar, **VISION** Publication.

8. Discrete mathematics by Naik and Patil, PHADAKE Prakashan

B. Sc. Part- I Computer Science Entire (Semester I)

Course Code: GEC-106: Mathematics Paper-II

Course Title: Algebra

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Relations** • Ordered pairs, Cartesian product • Relations, Types of relations, Equivalence relation, Partial ordering relation ,Examples • Digraphs of relations, matrix representation and composition of Relations , Examples • Transitive closure, Warshall's algorithm , Examples • Equivalence class, Partition of a set	12
2	**Divisibility of integers** • Introduction • Divisibility : Division algorithm (Statement only) • Greatest Common Divisor (GCD), Least Common Multiple (LCM) • Euclidean algorithm(Statement only) • Prime numbers, Euclides Lemma, Fundamental theorem of Arithmetic (without proof) • Congruence relation and its properties • Fermat's Theorem (Statement only). Examples. • Residue Classes: Definition, Examples, addition modulo n , multiplication modulo n.	12
3	**Boolean algebra** • Hasse digram • Lattice: Definition, principle of duality • Basic properties of algebraic systems defined by Lattices • Distributive and complemented lattices • Boolean lattices and Boolean algebras • Boolean expressions and Boolean functions • Disjunctive and conjunctive normal forms and examples	12

Reference Books

1. Algebra by S.R.Patil and Others Nirali Prakashan.
2. Algebra by Bhopatkar, Nimbkar, Joglekar, VISION Publication.
3. Algebra by Naik and Patil, PHADAKE Prakashan

B. Sc. Part- I Computer Science Entire (Semester II)

Course Code: GEC-205: Mathematics Paper-III

Course Title: Graph Theory

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Graphs and operations on graphs** • Definition and elementary results • Types of graphs • Isomorphism • Matrix representation of graphs : Adjacency matrix and incidence matrix • Subgraphs and induced graphs • Complement of a graph, Self complementary graphs • Union, intersection of graphs, Ring sum of two graphs	12

2	**Connected Graphs** • Definitions: walk, trail, tour, path and circuit, • Definitions of connected, disconnected graphs • Dijkstra's shortest path algorithm • Connectivity: Isthumus, cut-vertex, Edge connectivity & vertex connectivity.	**12**
3	**Tree Graphs** • Tree : Definition • Theorem : A tree with n vertices has n -1 edges. • Theorem : A connected graph G with n vertices and n - 1 edges is a tree • Theorem : A graph with n vertices is a tree if and only if it is circuit free and has n - 1 edges. • Theorem : A graph G is a tree if and only if it is minimally connected. • Centre of a tree • Spanning tree: Definition and examples • Fundamental circuit and cut - set : Definition • Binary trees and elementary results • Kruskal's algorithm.	**12**

Reference Books

1. Elements of Discrete Mathematics by C.L. Liu

2. Discrete Mathematical Structure for Computer Science by Alan Doer & K.Levasicur.

3. Discrete and Combinatorial Mathematics by R.m. Grassl

4. Discrete Mathematics by Kenneth Rosen,Tata McGraw Hill

5. Graph Theory with Applications to Computer Sc. & Engg. By Narsing Deo, PHI

6. A First Step in Graph Theory by Raghunathan, Nimkar and Solapurrkar

7. Discrete mathematics by S.R.Patil and others, NIRALI Prakashan.

8. Discrete mathematics by Bhopatkar, Nimbkar, Joglekar, VISION Publication.

9. Discrete mathematics by Naik and Patil, PHADAKE Prakashan

B. Sc. Part- I Computer Science Entire (Semester II)

Course Code: GEC-206: Mathematics Paper-IV

Course Title: Calculus

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Continuity and Mean value Theorems** • Continuity of a function and its properties defined on [a,b] (Properties without proof) • Differentiability. Differentiabilty implies continuity but not conversely. • Rolle's theorem(with proof) and its geometric significance and examples • Lagrange's Mean Value theorem(with proof) and its geometric significance and examples. • Cauchy's Mean Value theorem (with proof) and examples.	14
2	**Successive Differentiation:** • n^{th} derivatives of some standerd functions. • Examples on n^{th} derivatives and examples • Leibnitz's Theorem (with proof) • Examples on Leibnitz's Theorem	12
3	**Indeterminate Forms & Series Expansions** • Indeterminat forms, L'Hospital's Rule (without proof). • Examples on L'Hospital's Rule • Taylor's and Maclaurin's Theorems with Lagrange's and Cauchy's forms of Remainders (without proof) • Taylor's and Maclaurin's series • Series expansions of e^x, sinx, cosx, log(1 + x) etc	10

Reference Books

1. Calculus by Dr. S.B. Nimse
2. Differential Calculus by Shanti Narayan, S.Chand& Co.
3. A text book of Calculus and Differential equations by Dinde H. T. Lokhande A.D. SUMS Publication.
4. Calculus by Dr B.P.Jadhav and others Phadke Publication

Mathematics Practical – I & II

1. Recurrence relation
2. Combinatorial arguments
3. Proofs of valid arguments using truth table
4. Proofs of valid arguments using laws of inferences
5. Examples on equivalence relation
6. Euclid's algorithm, Division algorithm
7. Fermat's theorem on remainder
8. Warshall's algorithm
9. Disjunctive and Conjunctive normal forms of Boolean expression
10. Finite state machine,input tape output tape
11. Kruskal's algorithm
12. Dijkstra's Shortest path algorithm
13. Fundamental curcit and fundamental cut set
14. Union, intersection & Ring sum of two graphs
15. Rolle's Theorem
16. Lagrange's Maean Value Theorem
17. Cauchy's Maean Value Theorem
18. Series expansion of $\log(1+x)$, e^x, sinx, cosx, $(1+x)^n$
19. L'Hospital's Rule
20. Leibnitz's Rule

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B.Sc. Computer Science Entire Part-I

Statistics (Semester I & II)
Syllabus to be implemented from June 2018

Title of the Course	Statistics
Year of Implementation	Revised Syllabus will be implemented from June 2018 0nwards.
Duration	Part- I shall be of one academic year consisting of two semesters.
Pattern	Semester Pattern

STRUCTURE OF THE COURSE

Code	Paper	Name of the Paper	Marks
Computer Science Semester -I			
GEC-107	Paper-I	Descriptive Statistics - I	50
GEC-108	Paper-II	Probability Theory and Discrete Probability Distributions	50
Computer Science Semester -II			
GEC-207	Paper-III	Descriptive Statistics - II	50
GEC-208	Paper-IV	Continuous Probability Distributions and Testing of Hypothesis	50
Practical (Annual)			
Lab Course	Papers	Statistics Practical	100

EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED CBCS SYLLABUS)

Sr. No.	Title of the Old Paper	Sr. No.	Title of the New Paper
Semester I			
1	Descriptive Statistics - I	1	Descriptive Statistics - I
2	Probability and Discrete Probability Distributions	2	Probability Theory and Discrete Probability Distributions
Semester II			
3	Descriptive Statistics - II	3	Descriptive Statistics - II
4	Continuous Probability Distributions and Testing of Hypothesis	4	Continuous Probability Distributions and Testing of Hypothesis
Practical Annual Pattern			
5	Statistics Practical	5	Statistics Practical

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: GEC-107: Statistics Paper– I
Course Title: Descriptive Statistics– I
Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Nature of data and Measures of Central Tendency** • Definition, Introduction, importance, scope and limitations of Statistics. • Population and Sample: Concept of statistical population with illustrations, concept of sample with illustrations. Methods of sampling: Simple Random Sampling and Stratified Random Sampling (description only). • Data Condensation: Raw data, Attributes and variables, discrete and continuous variables, classification and construction of frequency distribution. • Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive curves, uses of Histogram and Ogive curves. • Examples and Problems. • 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, computation for ungrouped and grouped data, graphical method, merits and demerits. • Mode: Definition, computation for ungrouped and grouped data, graphical method, merits and demerits. • Quartiles: Definition, computation for ungrouped and grouped data graphical method. • Illustrative Examples.	**18**
2	**Measures of Dispersion and Moments** • 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, combine S.D. and variance for two groups, merits and demerits. • Illustrative Examples. • Raw and central moments: Definition for ungrouped and grouped data (only first four moments), relation between central and raw moments (statements only). • Measures of skewness: Types of skewness, Pearson's and Bowley's coefficients of skewness, Measures of skewness based on moments. • Measures of kurtosis: Types of kurtosis, Measures of kurtosis based on moments. Illustrative Examples. .	**18**

B. Sc. Part- I Computer Science Entire (Semester I)
Course Code: GEC-108 Statistics Paper– II
Course Title: Probability Theory and Discrete Probability Distributions

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Probability** • Idea of permutation and combination, concept of random experiments. • Definitions: sample space (finite and countably infinite), equiprobable sample space, events, types of events, power set (sample space consisting at most 3 sample points), examples. • Classical (apriori) definition of probability of an event, 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, examples. • 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 $A \subseteq B$ then $P(A) \leq P(B)$, v) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$ • Definition of conditional probability of an event, examples. • Partition of sample space, Baye's theorem (only statement) and examples. • Concept of independence of two events, examples. • 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. • Illustrative Examples.	**18**
2	**Discrete probability distributions** • 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. • Definition of expectation (mean) and variance of a random variable, expectation and variance of a function of random variable. • 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. • Theorems on Variance: i) $V(c) = 0$, where c is constant. ii) $V(aX + b) = a^2\,V(X)$, where a and b are the constants. • Discrete uniform distribution: p.m.f., mean and variance, examples. • Binomial distribution: p.m.f., mean and variance, additive property of Binomial variates, recurrence relation for probabilities, examples. • Poisson distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, examples.	**18**

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: GEC-207 : Statistics Paper– III
Course Title: Descriptive Statistics– II

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Correlation and Regression (for ungrouped data)** • Concept of bivariate data, scatter diagram,concept of correlation, positive correlation, negative correlation, cause and effect relation. • Karl Pearson's coefficient of correlation, properties of correlation coefficient, interpretation of correlation coefficient. • Spearman's rank correlation coefficient (formula with and without ties). • Concept of regression, Derivation of lines of regression by method of least squares. • Regression coefficients and their significance, Properties of regression coefficients. • Point of intersection and acute angle between regression lines (without proof). • Illustrative Examples.	18
2	**Multiple Regression and Multiple, partial Correlation (For Trivariate Data)** • Concept of multiple regressions, Yule's Notations. • Fitting of multiple regression planes, Partial regression coefficients, interpretations. • Concept of multiple correlation: Definition of multiple correlation coefficient and its formula. • Properties of multiple correlation coefficient (statements only). • Interpretation of multiple correlation coefficient when it is equal to zero and one. • Concept of partial correlation. Definition of partial correlation coefficient and its formula. • Properties of partial correlation coefficient (statements only). • Examples and problems. .	18

B. Sc. Part- I Computer Science Entire (Semester II)
Course Code: GEC-208: Statistics Paper– IV
Course Title: Continuous Probability Distributions and Testing of Hypothesis

Total Contact Hours: 36 hrs (45 lectures of 48 min)

Credits: 02 **Teaching Scheme: Theory – 03 Lect. / Week** **Total Marks: 50**

Unit	Contents	Hours Allotted
1	**Continuous Univariate Distributions** • 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. • Expectation of random variable, expectation of function of a random variable, variance and examples. • Uniform distribution: p.d.f., c.d.f., mean, variance and examples. • Exponential distribution: p.d.f., c.d.f., mean, variance, lack of memory property and examples. • Normal distribution: p.d.f., standard normal distribution, properties of normal curve, distribution of $aX+bY$, where X and Y are independent normal variates, examples. • Introduction to simulation, Model sampling from uniform and exponential distribution, Model sampling from normal distribution using Box-Muller transformation. • Chi-square distribution: Definition, chi-square variate as the sum of square of i.i.d. S.N.V (statement only), p.d.f., mean, variance, additive property, examples. • Student's t-distribution: Definition, nature of probability curve, mean and variance, examples. • Snedecor's F-distribution: definition, mean and variance, inter-relationship between chi-square, t and F distributions, examples.	18
2	**Testing of hypothesis** • Definitions: Sample, parameter, statistic, standard error. • Simple and composite hypothesis, Null and alternative hypothesis, type I and type II error, critical region, level of significance, one and two tailed tests, general procedure of testing of hypothesis. • Large sample tests i) Test for population mean $H_0: \mu = \mu_0$, ii) Test for equality of population means $H_0: \mu_1 = \mu_2$, iii) Test for population proportion $H_0: P=P_0$. iv) Test for equality of population proportions $H_0: P_1=P_2$. • Chi-square test: i) Test for goodness of fit ii) Test for population variance $H_0: \sigma = \sigma_0$ iii) Test for independence of attributes • t-test: i) Test for population mean $H_0: \mu = \mu_0$, ii) Test for equality of two population means $H_0: \mu_1 = \mu_2 (\sigma_1 = \sigma_2)$, iii) Paired t-test. • F-test: i) Test for equality of two population variances $H_0: \sigma_1 = \sigma_2$.	18

Reference Books

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 scienceapplications by K. S. Trivedi.

9. Fundamental of Mathematical Statistics by Gupta and Kapoor.

10. System simulation with digital computers by Narsingh Deo.

11. Introduction to Probability theory and Mathematical Statistics by V. K. Rohatgi

12. Testing of Statistical Hypothesis by E L. Lehmann.

13. 100 Statistical Tests by G. K. Kanji

Practical

List of Statistics experiments to be performed

1) Construction of frequency distributions and graphical methods.

2) Measures of central tendency.

3) Measures of dispersion.

4) Moments, skewness, kurtosis.

5) Correlation coefficient.

6) Fitting of lines of regression (Ungrouped data).

7) Fitting of regression planes and estimation.

8) Multiple Regression.

9) Multiple and partial correlation coefficients.

10) Fitting of Binomial and Poisson distributions.

11) Model sampling from Binomial and Poisson distributions.

12) Fitting of Uniform and Exponential distributions.

13) Fitting of Normal distribution.

14) Model sampling from Uniform and Exponential distributions.

15) Model sampling from Normal distribution using:

i) Normal table andii) Box-Muller transformation.

16) Large sample tests for means.

17) Large sample tests for proportions.

18) Tests based on Chi-square distribution.

19) Tests based on t distribution.

20) Tests based on F distribution.

Note:

1. Test of goodness of fit is necessary for every practical on fitting of distributions.
2. All practicals are to be done on computers using MS-EXCEL.
3. Calculations (observation table) should be done by using Statistical formulae.
4. Computer printout is to be attached to the journal.
5. Student must complete the entire practical to the satisfaction of the teacher concerned.
6. Student must produce the Laboratory Journal along with the completion certificate signed by the Head of the department, at the time of practical examination.

Laboratory Requirements:

Laboratory should be well equipped with sufficient number of (20) computers along with necessary software, printers, UPS. Statistical tables should be provided to the students during practical as per requirement.

Practical Examination will be conducted as:

1) Paper Work: In this session a student is expected to write formulae and format of required table.

2) Laboratory Work: A student is expected to execute the problems on the computer by using MS-EXCEL.

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B. Sc. Computer Science Entire Part- I
English (Semester I & II)
Syllabus to be implemented from June 2018

Title of the Course	English
Year of Implementation	Revised Syllabus will be implemented from June 2018 0nwards.
Duration	Part- I shall be of one academic year consisting of two semesters.
Pattern	Semester Pattern

STRUCTURE OF THE COURSE

Code	Paper	Name of the Paper	Marks
English Semester -I			
AECC-A	Paper-I	**English for Communication Paper-I**	50
English Semester -II			
AECC-B	Paper-III	**English for Communication Paper-II**	50

B. Sc. Computer Science Entire Part- I Semester I

Course Code: AECC-A: English paper-I

Course Title: English for Communication (Paper-I)

Syllabus to be implemented from June 2018

Credits: **Teaching Scheme: Theory – 04 Lect. / Week** **Total Marks: 50**

English for Communication

Course Objectives:

1. To acquaint students with communication skills.
2. To inculcate human values among the students through poems and prose.
3. To improve the language and business competence of the students.

Module I

A) Developing Vocabulary
B) Technology with a Human Face – E.F. Schumacher
C) How Beautiful - P. K. Padhy

Module II

A) Narration
B) As a Flower I Come - by Sundaram

Module III

A. Description
B. I Have a Dream - Martin Luther King

Module IV

A) The Auspicious Vision- Tagore
B. The Book - Iftikar Rizvi

Division of Teaching hours (Total 60 Periods)

1. Communication Skills: 3 X 12 = 36 periods
2. Reading Comprehension: 6X4 = 24 periods

English for Communication

Pattern of Question Paper

SEMESTER- I (AECC –A)

Paper - A

Total Marks: 50

Q. No.	Sub. Q.	Type of Question	Based on Unit	Marks
1	A	Four multiple choice questions with four alternatives to be set.	**Prose and poetry units.**	04
	B	Answer in one word/phrase/sentence each. (Skimming and scanning questions to be set.	**Prose and poetry units.**	04
2	A	Answer the following questions in three to four sentences each (4 out of 6)	**Prose and poetry units**	08
	B	Write short notes on the following in about seven to eight sentences each (3 out of 5)	**Prose and poetry units**	09
3	A B	Questions to be set on **Description** A)Describing objects/ persons B) Describing places/ Daily Routine	**Module III A**	05 05
4	A	Question to be set on **Developing Vocabulary** Do as directed: Four different exercises to be set for 2 marks each.	**Module I A**	08
	B	Question to be set on **Narration**	**Module II A**	07

B. Sc. Part- I Computer Science Entire Semester II

Course Code: AECC-B: English paper-II

Course Title: English for Communication (Paper-II)

Syllabus to be implemented from June 2018

Credits: **Teaching Scheme: Theory – 04 Lect. / Week** **Total Marks: 50**

English for Communication

Course Objectives:

1. To acquaint students with communication skills.
2. To inculcate human values among the students through poems and prose.
3. To improve the language and business competence of the students.

Module V

A) Telephonic Communication
B) Lost Forest - Johannes Jensen
C) Stopping by Woods - Robert Frost

Module VI

A) English for Spesific Purposes
B) Putting Data to Effective Use - Satish Tripathi

Module VII

A) English for Advertising
B) An Epithet- W.H.Davies

Module VIII

A)The Golden Touch -Nathaniel Howthone
B) Offering in the Temple -Desika Vinayakam Pillai

Division of Teaching hours (Total 60 Periods)

1. Communication Skills: 3 X 12 = 36 periods
2. Reading Comprehension: 6X4 = 24 periods

English for Communication

Pattern of Question Paper

SEMESTER II (AECC –B)

Paper - II

Total Marks: 50

Q. No.	Sub. Q.	Type of Question	Based on Unit	Marks
1	A	Four multiple choice questions with four alternatives to be set.	**Prose and poetry units.**	04
	B	Answer in one word/phrase/sentence each.	**Prose and poetry units.**	04
2	A	Answer the following questions in three to four sentences each (4 out of 6)	**Prose and poetry units**	08
	B	Write short notes on the following in about seven to eight sentences each (3 out of 5)	**Prose and poetry units**	09
3		Questions to be set on		
	A	Telephonic Communication	**Module V A**	8
	B	English for Advertising	**Module VII A**	7
4	A	Question to be set on English for Spesific Purposes	**Module VI A**	5
	B	Question to be set on English for Specific Purposes	**Module VI A**	**5**

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