

DEPARTMENT OF MATHEMATICS



B.Sc. (Hons.) in Mathematics & Computing

Effective from Academic Session – 2023-24

Course Curriculum (1st Year) - Scheme of the Courses (B.Sc. Maths & Computing):

First Semester

S. No.	Course Name	Course Code	Core/Elective	L	T	P	Credits	Contact Hours
1	Calculus	22BS1MA111	Core	3	1	0	4	4
2	Computer Fundamentals	22BS1CI111	Core	3	0	0	3	3
3	Fundamentals of Computer Hardware and Networking	22BS1CI112	Core	3	0	0	3	3
4	English	21B11HS111	Core	2	0	0	2	2
5	English Lab	21B17HS171	Core	0	0	2	1	2
6	Linear Algebra	22BS1MA112	Core	3	1	0	4	4
7	Programming for Problem Solving -II	19B11CI111	Core	2	0	0	2	2
8	Programming for Problem Solving Lab-II	19B17CI171	Core	0	0	4	2	4
Total							21	24

Second Semester

S. No.	Course Name	Course Code	Core/Elective	L	T	P	Credits	Contact Hours
1	Discrete Mathematical Structures	22BS1MA211	Core	3	0	0	3	3
2	Fundamentals of Probability and Statistics	22BS1MA212	Core	3	1	0	4	4
3	Data Structures and Algorithms	18B11CI211	Core	3	1	0	4	4
4	Introduction to Object Oriented Programming	22BS1CI211	Core	3	1	0	4	4
5	Life Skills and Effective Communication	21B11HS211	Core	1	0	0	1	1
6	Life Skills and Effective Communication Lab	21B17HS271	Core	0	0	2	1	2
7	Environmental Science and Technology	22BS1GE211	Core	2	0	0	2	2
8	Data Structures and Algorithms Lab	18B17CI271	Core	0	0	4	2	4
9	Lab - Introduction to Object Oriented Programming	22BS7CI271	Core	0	0	2	1	2
Total							22	26

Tentative Summary for 4 Yr B.Sc. Program (Research)*

Semester	Credits
I	21
II	22
III	23
IV	26
V	28
VI	20
VII	12
VIII	13
Total	165

*As per the NEP 2020 framework,
40 credits will be needed for a certificate
80 to get a diploma
120 for a bachelor's degree
160 credits for a degree with honours/research.

Ability Enhancement Compulsory Courses (AECC) included
Department Specific Electives (DSE), Generic Electives (GE), Open
Electives (OE) are also included in the subsequent years

CALCULUS

COURSE CODE: 22BS1MA111

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P : 3-1-0

Pre-requisite: None

Course Objectives: This course gives a foundation on Calculus Differential & Integral and emphasizes

- To learn fundamental concepts of one variable calculus and its applications.
- To study the hyperbolic functions, and basics of curves.
- To learn basic concepts of definite integrals and its applications.
- To study fundamentals of the sequence and series.
- To introduce the extension of single variable calculus to multivariable calculus.

Course Outcomes: On Completion of this course the students will be able to:

S.No.	Course Outcomes	Level of Attainment
CO-1	Compare and contrast the ideas of continuity and differentiability. To find maxima and minima, critical points and inflection points of functions	Familiarity
CO-2	Recognize the appropriate tools of calculus to solve applied problems, curve tracing and understand the special functions and various co-ordinate systems	Assessment
CO-3	To understand the fundamental theorem of calculus, and some applications of definite integrals to investigate length of curves, moments and center of mass, surfaces of revolutions, and improper integrals.	Assessment
CO-4	To understand various types of convergence of sequence and series, Power series. Moreover, a brief introduction to multivariable calculus: limits and continuity, partial derivatives, Homogeneous Functions and Euler's theorem with applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Single Variable Calculus: Limits and continuity of single variable functions, differentiation and applications of derivatives, Maxima and Minima, Extrema on an interval, Rolle's Theorem, Mean Value Theorem and Applications, Fundamental Theorem of Calculus.	9
2	Transcendental Functions, Hyperbolic functions, higher order derivatives, Leibnitz rule, curvature, curve tracing in Cartesian coordinates. Polar coordinates, parametric equations, Parameterization of a curve, arc length of a curve.	9

3	Definite integrals, fundamental theorem of calculus, Applications to length, moments and center of mass, surfaces of revolutions, improper integrals.	9
4	Sequences, Series and their convergence, absolute and conditional convergence, Uniform convergence, power series, Taylor's and Maclaurin's series	8
5	Introduction to Multi-variable Calculus: Functions of several variables- limits and continuity, partial derivatives, Chain rule, Homogeneous Functions and Euler's Theorem and Applications.	7
Total Lectures		42

Suggested Text Book(s):

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry, Pearson Education India.
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.

Suggested Reference Book(s):

3. Gilbert Strang, "Calculus", Wellesley-Cambridge Press; 2nd edition, 2010.
4. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Calculus)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	
Average													

Computer Fundamentals

COURSE CODE: 22BS1CI111

COURSE CREDITS: 3

CORE/ELECTIVE: Core

L-T-P : 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn the computer organization.
2. Learn various number systems and conversion.
3. Learn various data design paradigms.
4. Learn basic computer operations and its logical implementation.
5. Planning the computer program.
6. Learn the basic association with computer environment.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Comprehension of the computer design.	Familiarity
CO-2	Demonstrate the logic of computer system.	Assessment
CO-3	Understanding and application of computer language .	usage
CO-4	Understanding of association with computer environment	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Introduction to computers: Data processing, Characteristic features of computers, Computers' evolution to their present form, Computer generations, Characteristic features of each computer generation, Basic operations performed by all types of computer systems, Basic organization of a computer system, Input unit and its functions, Output unit and its functions, Storage unit and its functions, Types of storage used in a computer system	8

2	Number system: Non-positional number system , Positional number system, Decimal number system, Binary number system, Octal number system, Hexadecimal number system, Computer code: Computer data, Computer codes: representation of data in binary, Most commonly used computer codes, Collating sequence	8
3	Computer arithmetic: Reasons for using binary instead of decimal numbers, Basic arithmetic operations using binary numbers, Addition (+) , Subtraction (-) ,Multiplication (*), Division (/) Boolean algebra and logic circuit: Fundamental concepts and basic laws of Boolean algebra, Boolean function and minimization, Logic gates, Logic circuits and Boolean expressions, Combinational circuits and design	6
4	Processor and Memory: Internal structure of processor, Memory structure, Determining the speed of a processor, Different types of processors available, Determining the capacity of a memory, Different types of memory available, Several other terms related to the processor and main memory of a computer system Secondary storage device: Requirement, Classification of commonly used secondary storage devices, Difference between sequential and direct access storage devices ,Basic principles of operation, types, and uses of popular secondary storage devices such as magnetic tape, magnetic disk, and optical disk	8
5	Programming language: Introduction, Generation of programming language, Characteristics of good programming language, Assembly language, Categorization of High level language, Develop a programme, Compiling High level language programme, some high level language	6
6	Computer software: Types of computer software, system management programs, System Development Programs, standard application programs, unique application programs Operating system: Classification of OS (multi programming, time sharing), function of OS, Unix OS, Microkernel based OS, Online and Real time OS	6
Total lectures		42

Suggested Text Book(s):

1. Singiresu S. Rao, Engineering Optimization: Theory and Practice by John Wiley and Sons, 4th edition, 2009.
2. H. S. Kasene & K. D. Kumar, Introductory Operations Research, Springer (India), Pvt. Ltd., 2004
3. Optimization for Engineering Design. K Deb.

Suggested Reference Book(s):

1. Sheskin, David J. (2003) Handbook of Parametric and Nonparametric Statistical Procedures. CRC Press.
2. Optimization concepts and applications in engineering, A. D. Belegundu and T. R. Chandrupatla.
3. Linear and Nonlinear programming. Stephen G. Nash and A. sofer

Fundamentals of Computer Hardware and Networking

COURSE CODE: 22BS1CI112

COURSE CREDITS: 3

CORE/ELECTIVE: Core

L-T-P : 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand the working principle of various communication protocols.
2. To know the concept of data transfer between nodes
3. To learn the fundamentals of Comprehension of the computer design.
4. Learn Internal and External components of computer.
5. Describe and analyze computer hardware, software, and the internet.
6. Understanding of components of networking.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Comprehension of the computer design.	Familiarity
CO-2	Learn Internal and External components of computer	Assessment
CO-3	Understanding the overview of networking.	Familiarity
CO-4	Understanding of components of networking	Familiarity
CO-5	Understanding PC Architecture & Microprocessor system	Familiarity
CO-6	Understanding Transmission Media and Topologies Media types	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Microprocessor System Introduction of System overview, Introduction to Processors, Memory Interfacing, Interfacing I/O Devices, Interfacing Data Converters, Display Interface, Serial I/O and Data Communication, Higher level Processors	7
2	Introduction to PC Architecture Study of PC-AT/ATX System, Pentium, Core, Core 2 Cord, Core 2 Duo, I3, I5, I7 Processor Basics of Processor and CPU Block Diagram of Computer and Computer Generation Motherboards, Chipset and Controllers, BIOS and the Boot Process, Computer Memory.	6
3	Internal Components IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types. External Components Monitors CRT, LCD and LED Displays, Printers:- Dot-Matrix Printer, Inkjet Printer, Laser Printer Scanner:- Photo Scanner, Documents Scanner, Bar Cord Scanner Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Power supply, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.	8
4	Network Components Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, USB Network Sharer, Backup Device, Server Hardware etc.	7
5	Overview of Networking Introduction to networks and networking, LAN, VLAN, CAN, MAN, WAN, Internet and Intranet etc. Uses and benefits of Network, Server-client based network, peer to peer networks. Network Hardware and Components Concept of Server, client, node, segment, backbone, host etc. Analog and Digital transmission, Network Interface Card, Crimping tools and Color standards for Straight crimping and Cross crimping Functions of NIC, Repeaters, Hub, Switches, Routers, Bridges, Router etc.	7
6	Transmission Media and Topologies Media types STP cable, UTP cable, Coaxial cable, Fiber cable, Base band and Broadband transmission, Cables and Connectors, Physical and logical topologies, Bus, Star, Ring and Mesh topologies	7
Total lectures		42

Suggested Text Book(s):

- 1) Networking Complete BPB Publication
- 2) Computer Networking Andrew S. Tanenbawan By PHI
- 3) Microprocessor Architecture Programming and Application with the 8085 Ramesh Gaonkar Penram International Publication

Suggested Reference Book(s):

- 1) Electronics and Radio Engineering M.L. Gupta Dhanpat rai & Sons, New Delhi 2004.
2. Anita Goel, Computer fundamentals By Pearson, 1st edition, 2010.

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

English

COURSE CODE: 21B11HS111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P : 2-0-0

Pre-requisite: None

Course Objectives:

1. The Student will be able to analyze communication situations and audiences to make choices about the most effective and efficient way to communicate and deliver messages.
2. The student will learn to deliver effective presentations in contexts that may require power point, extemporaneous or impromptu oral presentations
3. The student will learn to write grammatically correct business documents using appropriate business style.
4. The student will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
5. Students will develop command over their language and synchronize their thoughts into written form

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understand and learn the concepts of better and effective communication	Familiarity
CO2	Learn the basics of business etiquettes, values and personal goal setting	Familiarity
CO3	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Assessment
CO4	Help make communication stronger by learning the nature and mechanics of effective writing.	Assessment
CO5	Learn the different formats of business writing with correct knowledge of grammar.	Usage
CO6	Develop command over language, using techniques of vocabulary building and identifying common errors, redundancies and grammatical syntax.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Concept and Nature of Communication: What is communication? Stage of communication. Ideation, encoding, transmission, decoding & response Channels of communication. Communication in organizational settings Etiquettes in social and Office settings. Work culture in Jobs Barriers to effective communication. Guidelines to overcome communication barriers	4
2	Self Development and Assessment: Self Assessment, Awareness,. Personal goal Setting	2
3	Effective presentation: Pre- presentation jitters. Preparation and practice Delivering the presentation. Qualities of a skilful presenter. Capturing and maintaining attention. Handling questions Power point presentations	4
4	Nature and Mechanics of Writing (Basic Writing Skills): Technique for writing precisely: Defining. Describing, Classifying. Use of Phrase and Clauses in sentences Importance of Proper Punctuation. Organizing Principles of Paragraphs in documents	5
5	Technical Writing: Importance, structure and drafting and revising of Technical Reports. Technical writing style and Language. Business writing: Letters, Preparing resume, notices, agenda and minutes of meeting ,Daily Dairy entry	6
6	Vocabulary Development: Word Formation. Derivatives: Prefixes & Suffixes. Root words. Synonyms, Antonyms, Homophones and Homonyms One word substitution	2
7	Grammar and Usage: Subject-Verb Agreement. Noun-Pronoun Agreement. Prepositions, Articles	3
8	Identifying Common errors in writing : Redundancies, Clichés , Misplace modifiers, words often confused and misused	2
Total lectures		42

Suggested Text Book(s):

1. Practical English Usage. Michael Swan. OUP.1995.
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001.
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006

5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. OUP
6. A Communicative Grammar of English. 3rd Edn. G. Leech and J. Svartvik. 2012
7. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.
8. Murphy, Herta A., Herbert Hildebrandt, Jane Thomas (2008) Effective Business Communication 7th Ed. New Delhi: Tata McGraw Hill Education Private Limited.
9. Guffey, M. A. (2000) Business Communication: Product & Process South-Western College Publishing.

Suggested Reference Book(s):

1. Lesikar, R. V., Flatley, M.E., Rentz, K. & Pande, N. (2009) Business communication 11th Ed. New Delhi: Mc Graw Hill.
2. Communication Skills. Sanjay Kumar and Pushp Lata. OUP. 2011.
3. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Etiquettes in Social and Office Settings (5) Self Development and Assessment (8) Notice and letter Writing/Report Writing(12)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (English and Technical Communication)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	3	3	3	1	2	3	3	3	3	1	3	2.4
CO-2	1	2	3	2	1	1	2	3	3	3	1	3	2.0
CO-3	1	2	3	2	2	2	1	2	3	3	1	3	2.0
CO-4	1	1	2	3	2	1	1	3	2	3	1	3	1.9
CO-5	1	2	3	2	2	2	1	3	2	3	1	3	2.0
CO-6	1	2	2	2	2	2	1	3	2	3	1	3	2
Average	1	2	2.6	2.3	1.6	1.6	1.5	2.8	2.5	3	1	3	

English Lab

COURSE CODE: 21B17HS171

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P : 0-0-2

Pre-requisite: None

Course Objectives:

1. The students will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
2. The students will learn the rules of grammar in writing. It will enhance their ability to use logical sequencing while writing any business letter or document.
3. The students will learn using new words and build their vocabulary steadily and systematically by following the exercises.
4. Students will develop command over their language and synchronize their thoughts while writing different types and kinds of Business letters.
5. Students will be groomed to develop the art of speaking logically, confidently and pragmatically which involves understanding work ethics and manners and the correct use of body language.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understand and sharpen writing skills using correct grammar in Emails, Business letters and Report writing.	Usage and Assessment
CO2	Learn the basics of successful job applications.	Usage and Assessment
CO3	Help make communication stronger by learning Non verbal cues and correct Body Language.	Familiarity and Assessment
CO4	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Familiarity and Assessment

CO5	Develop advanced vocabulary by learning to use different ways of word construction and strategies of learning new words.	Usage and Assessment
CO6	Learn about the ethics of writing and different types of formats in documents with command over language.	Usage and Assessment

List of Exercises

Subject Code	21B17HS171	Semester	1
Subject Name	English Lab		
Credits	01	Contact Hours	14

Faculty (Names)	Coordinator(s)	1. Dr. Papiya Lahiri
	Teacher(s) (Alphabetically)	1. Dr. Papiya Lahiri 2. Dr. Neena Jindal

Lab Exercise No.	Subtitle of the Module	Topics	Hours
1.	Essays: For and Against Software: Practical Writing	What will I learn? Stages of writing Brainstorming (1) Brainstorming (2) Planning your essay (1) Choosing a style Quick quiz: the Writing Process	1
2.	Job Applications: Your Online Profile Software: Practical	What will I learn? Your online profile: overview	1

	Writing	<p>What does a profile look like</p> <p>The structure of a profile</p> <p>Proofreading: grammar Spell checking</p> <p>Writing focus: punctuation marks</p> <p>Practise proofreading</p> <p>Quick quiz: your personal profile</p>	
3.	Official Letters Software: Practical Writing	<p>What will I learn in this unit?</p> <p>Official letters: layout</p> <p>Official letters: vocabulary</p> <p>Build up an official letter</p> <p>Letters: style</p> <p>The cover letter: job applications</p> <p>Letters: proofreading</p> <p>Present perfect or simple past?</p> <p>Quick quiz: letters</p>	1
4.	Emails: Asking for Information (I) Software: Practical Writing	<p>What will I learn?</p> <p>Emails: an overview</p> <p>Emails: structure</p> <p>Finding functional language (study sheet)</p> <p>Asking people to do things</p> <p>Enquiries and Responses</p>	1
5.	Emails: Asking for Information (II) Software: Practical Writing	<p>Functional language for emails</p> <p>Emails: Correcting mistakes</p> <p>Write two emails (on PC note pad)</p> <p>Vocab Focus</p>	1

		Quick quiz: Email basics	
6.	Use of Body Language	This exercise will include showing a couple of videos to the students on the use of Body Language in communication and also how to interpret other people's body language when they communicate. This will include studying facial expressions, gestures, non- verbal cues and eye contact.	1
7.	A Short Report: Graphs (I) Software: Practical Writing	What will I learn in this unit? A report on graph Choosing tenses (1) Choosing tenses (2) Write a report (1) [on PC note pad] Prepositions of time (1) Describing differences (1) Quick quiz: A report on graphs	1
8.	A Short Report: Hotel and restaurants (II) Software: Practical Writing	What will I learn? Restaurant reviews: structure Vocab: Hotels and restaurants Topic sentences (1) Mixing sentences (1) Mixing sentences (2) Past or Present? Write two reviews (Any one of the two on PC note pad) Quick quiz: a short report	1
9.	Use of Power point presentation	This exercise will comprise of two videos on the specifics of preparing power- point presentations; the Do's and don'ts; examples from	1

		successful business entrepreneurs' presentations.	
10.	Vocabulary Development	<p>Synonyms, Antonyms, Standard Abbreviations</p> <p>One word Substitution</p> <p>Homophones, Homonyms, Paronyms, Words often confused and misused</p> <p>Word Functioning Idiomatically</p> <p>Foreign Words</p> <p>Prefixes Suffixes (5 each on PC note pad)</p>	1
11.	Reported Speech Software :Tense Buster	<p>Introduction</p> <p>The Rule</p> <p>Practice: Pronouns</p> <p>Practice: Verbal Actions</p> <p>Pronunciation: Stress and Rhythm</p> <p>Do you understand?</p> <p>Vocab: Reporting verb</p> <p>Your test</p>	1
12.	Essays: Descriptive Software: Practical Writing	<p>What will I learn?</p> <p>Planning your essay (1)</p> <p>Planning your essay (2)</p> <p>Words and senses (1)</p> <p>Vocab focus: choosing precise words</p> <p>Linking ideas (1)</p> <p>Linking ideas (2)</p> <p>Quick quiz: descriptive essays</p>	1

13.	Avoiding Plagiarism Ist part Software: Practical Writing Taking Notes IInd part Software: Practical Writing	What will I learn? Plagiarism: an overview Identify plagiarism Past or present? Quick quiz: plagiarism <u>Taking notes</u> What will I learn? Taking notes: the main points Taking notes: the layout Taking notes: abbreviations Quick quiz: taking notes	1
14.	Text speak Software: Practical Writing	What will I learn? Text speak: an overview Text terms (1) Text terms (2) Inviting people to do things Responding appropriately Text speak and speaking Quick quiz: text speak	1
Total			14

Methodology

The course follows a lab based teaching-learning method with classroom discussions and activities on fundamental concepts of grammar with a strong emphasis on skill development of students with regard to speaking, writing, logically interpreting ideas into words and reasoning in the classroom. The exercises are solved by the students on the software's and the marking is automatically shown. Additionally, they are asked to draft letters and memos in their Lab files/registers after reading specimens on the software's and improve their English with choice of specific and technical words.

Evaluation

Sr. No.	Components	Total Marks
1	Proforma	10
2	Mid Term	20
3	End term	20
4	Tutorial Activities	50
	Total	100

SOFTWARE DETAIL

There are presently three softwares running in the Language Lab. These are as follows:

1. Software Clarity S. Net 7

This software supports Wireless LAN and wired LAN.

Main Functions

1. Screen Broadcast: Teacher PC can broadcast the screen, video file, flash smoothly without delay to student PC.
2. Voice Broadcast: Teacher can broadcast his voice without delay to student PC.
3. Screen Recorder: Teacher and student can record their own operations and then save in video file, which can be broadcast in any PC which has installed media player
4. Monitor: Teacher can monitor any student PC in the classroom.
5. Media Player. Teacher can broadcast all kinds media file formats, such as MPEG, DAT, MVI and so on, to student PC without delay.
6. Control Website and application: Teacher can restrict student to visit any website or application freely.
7. Teacher can remote open website on student PC.
8. Group Teaching: Teacher can divide the students into several groups, and set leader for each group to run group teaching.
9. Exam: It has strong exam functions. Teacher can know student study progress from students by using this function easily.
10. Remote Command: Teacher can remote run the program in student PC; teacher can remote start-up, turn off and restart student computer.
11. File transfer and collect the file: Teacher can transfer the file to student PC easily, and also teacher can collect the file from student PC.
12. Restrict USB: Teacher can restrict student to use USB flash memory freely.
13. Digital Recorder: It can record teacher and student voice, which can be used in language lab.

Requirements

Teacher side Requirements: CPU Core 2 E6300, 2Gbytes Memory, 256Mbytes Display Card

Student side Requirements: CPU Core 2 E4300, 1Gbytes Memory, 128Mbytes Display Card

Operating System: Support all Windows, includes Windows 8.1,8, 7, Vista, XP and so on.
Network: Wired Network 10MB/100MB/1000MB. Wireless Network 802.11n.

Overview:

Clarity English publishes programs, aimed at specific language areas in English like Grammar, Reading, Study Skills & Results Tracking. Under 'Clarity English', there are three softwares in our language lab which are Tense Buster, Practical Writing and Clear Pronunciation. The Program named Tense Buster focuses on 33 areas of Grammar through reading, listening, speaking & writing. It is one of a kind which is accepted by British Council in all its 226 teaching centres.

2. Software: Tense Buster 9.0 (3 years)

Licence Details

Tense Buster V11

Licence type: Anonymous Access

Version: International English

Number of concurrent users: 33

Start date: 2021-08-09

Expiry date: 2025-08-08

Tense Buster is an ESL (English as a second language) program which focuses on helping students improve their reading, writing, listening, speaking, vocabulary and grammar skills in 5 levels (beginner, upper intermediate, intermediate, lower intermediate, advanced).

Tense Buster covers 33 aspects of the English language through presentations, practice exercises, rules, tests and learner training tips. Students learn how to ask questions, make comparisons, and report on what they've heard, in addition to learning how to describe past, present and future events.

Each unit begins with a presentation of a grammar topic based on a dialogue, a newspaper article, a radio broadcast or an extract from a story, where learners are encouraged to form theories about how the grammar works. Next comes checking questions focusing on key areas of difficulty, and a grammar rule. Students move on to practice and testing activities in which the language is contextualized and key aspects of form and function are highlighted. Each unit includes a video-based pronunciation activity relating to an aspect of the grammar. Finally, each unit includes a vocabulary session and ends by suggesting extension activities. All activities include detailed feedback.

Multimedia Authoring Kit

This kit enables the teacher to create effective exercises tailored to students' specific needs. The Tense Buster multimedia Authoring Kit comprises a wide range of exercise types. It lets you add your own material and adapt the courses to the needs of your students. Use any one of

these formats to create your own activities: drag and drop, proof reading and free practice as well as target spotting, multiple choice questions, true/false, text and gap fill.

3. Software: Practical Writing

Licence Details (3 years)

Practical Writing V11

Licence type: Anonymous Access

Version: International English

Number of concurrent users: 33

Start date: 2021-08-09

Expiry date: 2025-08-08

This cloud based software helps in developing the writing skills of the students. It has 10 core skill development areas:

1. Essays: For and Against
2. Job Applications: your online profile
3. Emails: Asking for Information
4. A Short Report: Graphs
5. A Short Report: Hotels and Restaurants
6. Avoiding Plagiarism
7. Taking Notes
8. Essays: Descriptive
9. Textspeak
10. Official Letters

Each area deals with a separate set of exercises that are designed to master the skill set of LSRW. It entails learning about reports, cover letters, resumes, drafting business letters, textspeak, spell check etc. It covers a wide range of topics on grammar, functional language, formal and communicative language. The Lab exercises will be covered from Tense Buster and Practical Writing software.

Every week the students perform the exercises and enter their auto-system-generated scores on the printed pro forma.

4. Software: Clear Pronunciation 2 V11

License Details (1 year)

Clear Pronunciation 2 V11
Licence type: Anonymous Access

Version: British English
Number of concurrent users: 33
Start date: 2021-08-09
Expiry date: 2022-08-08

This software is particularly for learning and practicing phonetics or the study of the sounds of human speech. It deals with five distinct areas:

- Consonant Clusters
- Word Stress
- Connected Speech
- Sentence stress
- Intonation

All these areas will make the students practice correct pronunciation and listen to their own recorded voices and make improvement.

LINEAR ALGEBRA

COURSE CODE: 22BS1MA112

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P : 3-1-0

Course Objectives: On successful completion of this course, a student will be able

1. To solve system of linear equations, and interpret existence and uniqueness of solutions geometrically.
2. To learn and recognize linear independence, span and dimension, and apply them to vector spaces.
3. To learn eigenvalues, eigenvectors and understand the idea behind diagonalization process.
4. To understand the relationship between a linear transformation and its matrix representation.
5. To describe vector projections, compute orthonormal basis and spectral decomposition.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the roll of matrices and their properties to solve the system of linear equations;	Familiarity
CO-2	Find eigenvalues, eigenvectors of matrices and perform diagonalization.	Assessment
CO-3	Understand linear transformation and find the matrix representation; Compute eigenvalues and eigenvectors of a square matrix; Perform factorization of a square matrix.	Assessment
CO-4	Understand basic concepts of inner product on vector spaces; Compute the orthogonal projection of a vector onto a subspace; Construct an orthonormal basis for an inner product space using the Gram Schmidt process.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Matrices: Algebra of matrices, row echelon form, row reduced echelon form, inverse and rank of a matrix; Kernel or Null space and solutions of linear system of equations by Gauss Elimination, Gauss-Jordan method, LU decomposition (of a matrix); Cayley-Hamilton Theorem.	8
2	Vectors space: Basics of groups, rings and fields; real and complex vector spaces; properties of vector spaces;linear dependence, basis and change of coordinates in R^n ; linear span, dimension of vector space; Steinitz exchange lemma; row and column spaces associated to a matrix.	8
3	Vectors and transformations: Linear transformations - image and kernel of a linear transformation; Rank-Nullity theorem; matrix representations, change of basis, dual bases;implications for linear systems.	8

4	Inner product spaces: Introduction, norm of a vector, Cauchy-Schwarz Inequality, Triangle Inequality, generalized theorem of Pythagoras; direct sum of subspaces and its orthogonal complement; fundamental subspaces associated to a matrix and Fundamental theorem of Linear Algebra; Gram-Schmidt orthonormalization, orthogonal projections and least-square problems; Adjoint of a linear operator and linear functional.	10
5	Matrix Factorization: Eigenvalues and Eigenvectors, diagonalization – orthogonal diagonalization of symmetric matrices; Complex matrices and eigenvalues - Hermitian and unitary and normal matrices; Spectral theorem; Application of eigenvalues and in discrete dynamical systems.	8
Total Lectures		42

Suggested Text Book(s):

5. Gilbert Strang, ``Linear Algebra and Learning from Data,`` Wellesley-Cambridge Press, 2019.
6. R. K. Jain & S. R. K. Iyenger, ``Advanced Engineering Mathematics,`` 5th Edition, Narosa Publishing House, New Delhi, India, 2017
7. Ward Cheney, David R. Kincaid, ``Linear Algebra: Theory and Applications,`` 2nd Edition, Jones & Bartlett Learning, 2012.
8. David Poole, ``Linear Algebra: A Modern Introduction,`` 3rd Edition, Cengage, 2011.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Linear Algebra)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	1	2	1	2	2	2	2	1.9
CO-2	2	3	2	3	2	1	2	1	2	2	2	2	2
CO-3	2	2	3	2	2	1	2	1	2	2	2	2	1.9
CO-4	3	3	3	3	2	1	2	1	2	3	3	2	2.3
Average	2.5	2.5	2.5	2.5	2	1	2	1	2	2.3	2.3	2	

Programming for Problem Solving-II

COURSE CODE: 19B11CI111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 2-0-0

Pre-requisite: None

Course Objectives:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration

Course outcomes:

S.NO	Course outcomes	Level of Attainment
CO-1	To formulate simple algorithms for arithmetic and logical problems.	Familiarity
CO-2	To translate the algorithms to programs (in C language).	Familiarity
CO-3	To test and execute the programs and correct syntax and logical errors.	Usage
CO-4	To implement conditional branching, iteration and recursion.	Usage
CO-5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.	Usage
CO-6	To use arrays, pointers and structures to formulate algorithms and programs.	Usage
CO-7	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.	Assessment
CO-8	To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Programming (4 lectures) Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture) From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable	4

	code- (2 lectures)	
2	Arithmetic expressions and precedence	2
3	Loops: Conditional Branching and Loops (6 lectures) Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)	6
4	Arrays: Arrays (1-D, 2-D), Character arrays and Strings	6
5	Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).	6
6	Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	5 4
7	Structure: Structures, Defining structures and Array of Structures	4
8	Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation) File handling	3 2
Total lectures		42

Suggested Text Book(s):

1. Byron Gottfried, Schaum's Outline of Prokligramming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Book(s):

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Other useful resource(s):

1. Link to NPTEL course contents: <https://onlinecourses.nptel.ac.in/noc18-cs10>
2. Link to topics related to course:
 - a. <https://www.learn-c.org/>
 - b. <https://www.programiz.com/c-programming>
 - c. <https://www.codechef.com/ide>

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Programming for Problem Solving)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	2.5
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	2.6
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	2.4
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	2.5
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	2.4
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	2.6
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	2.4
CO-8	3	2	3	2	2	3	2	3	2	2	3	3	2.5
Average	2.6	2.1	2.6	2.1	2.4	2.6	2.5	2.6	2.1	2.5	2.9	2.8	

Programming for Problem Solving Lab-II

COURSE CODE: 19B17CI171

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 0-0-4

Pre-requisite: No prior programming experience is expected however, mathematical maturity level of science or engineering undergraduate is assumed.

Course Objectives:

1. Develop problem solving ability using programming.
2. To impart adequate knowledge on the need of programming languages and problem solving techniques.
3. To develop a methodological way of problem solving
4. Analyze and construct effective algorithms
5. Employ good programming practices such as incremental development, data integrity checking and adherence to style guidelines
6. Learn a programming approach to solve problems

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the Typical C Program Development Environment, compiling, debugging, Linking and executing.	Familiarity
CO-2	Introduction to C Programming using Control Statements and Repetition Statement	Usage
CO-3	Apply and practice logical formulations to solve some simple problems leading to specific applications.	Assessment and Usage
CO-4	Design effectively the required programming components that efficiently solve computing problems in real world.	Assessment & Usage

List of Experiments:

S.No	Description	Hours
1	Getting acquainted with the C program Structure and basic I/O. Getting acquainted with the various data types and arithmetic operator used in C.	2
2	Write a program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not. Write a program to check whether a triangle is valid or not, when the three angles of triangle are entered through the keyboard. A triangle is valid if the sum of all three angles is equal to 180 degrees. Check a given I/P is character, number or special symbol.	2
3	WAP to check a given number is Armstrong or not. Calculate factorial of a number Given number is prime or not.	2
4	Write a program to add first seven terms of the following series using any loop: $1/1! + 2/2! + 3/3! + \dots$ Any five pattern program.	2
5	WAP to swap two numbers with function using 3 rd variable or without using (call by value & reference).	2

	Write a function to find out the roots of quadratic equation.	
6	Factorial using recursion Fibonacci series using recursion.	2
7	WAP to sort N elements of an array using bubble sort. WAP for Binary search & linear search.	2
8	Find Max, Min, 2 nd Max, Standard Deviation. Reverse elements of an array.	2
9	Matrix addition, Multiplication and Transpose.	2
10	WAP to handle pointer variables and access the elements of an array using pointers. WAP to insert a string and perform operations: string length, copy, concatenation, compare, lower to upper, etc.	2
11	Write a program to find whether the string is palindrome or not using pointers Write a program to delete all vowels from sentence, assume that sentence is not more than 80 character long using pointers.	2
12	Enter the detail of 5 students using structure and print the details of all students including pointers and also sort the detail of students using DOB.	2
13	Dynamic allocation function and random function with string and integer array.	2
14	Perform operation on files: open, read, write, close etc.	2
Total Lab hours		28

Suggested/Resources:

1. Yale N. Patt and Sanjay J. Patel, Introduction to Computing Systems, from bits & gates to C & beyond, 2nd Edition, 2004.
2. Deitel and Deitel, C How to Program, 7th Edition, 2013.
3. Venugopal Prasad, Mastering C, Tata McGraw Hill.
4. Complete Reference with C, Tata McGraw Hill.
5. Drmey, How to solve it by Computer, PHI.
6. Kernighan and Ritchie, The C Programming Language.
7. http://www.acm.uiuc.edu/webmonkeys/book/c_guide/
8. <http://msdn.microsoft.com/en-us/library/25db87se.aspx>

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	Average
CO1	3	3	1	1	2	2	1	1	1	2	1	2	1.7
CO2	3	3	2	1	3	1	1	1	1	2	1	2	1.8
CO3	3	3	2	2	2	3	2	1	1	2	2	2	2.1

Discrete Mathematical Structure

COURSE CODE: 22BS1MA211

COURSE CREDITS: 3

CORE/ELECTIVE:

L-T-P : 3-0-0

~~Pre-requisite: Basic Mathematics~~

Course Objectives:

1. Use of various set operations, relations and functions concept to solve applied problems.
2. To simplify and evaluate any logical expression and to express logical statements in terms of logical connectives, predicates and quantifiers.
3. To learn and perform various graphs and trees terminologies, traversals & their applications.
4. To learn the use of finite state machines

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand set operations, various types of relations & their representations, solving recurrence relations	Familiarity
CO-2	comprehend the discrete structures of lattices, Propositions with proof of validity of arguments and quantifiers	Assessment
CO-3	Understand various types of graphs, paths, spanning tree ,planarity of graphs and coloring theorems	Usage
CO-4	Recognize Algebraic structures; Groups, Subgroups, Rings, Fields with extension to concepts of vector spaces, dimensions and linear transformations.	Assessment
CO-5	Comprehend Languages, grammars, finite state automata & finite state machines.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Set, Relations and Functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Partitions and Duality. Different types of relations, their compositions and inverses. Different types of functions, Recursively defined functions, Recursive algorithms, generating functions and solutions of recurrence relations.	10
2	Lattices and Propositional Logic: Ordered Sets and Lattices: Partial order relations and Hasse diagram, Supremum and infimum, total ordering, lattices – bounded, distributive, complemented, modular, Product of lattices. Simple and compound statement. logical operators. Implication and double implication, Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	12

FUNDAMENTAL OF PROBABILITY AND STATISTICS

COURSE CODE: 22BS1MA212

COURSE CREDITS: 4

CORE/ELECTIVE:

L-T-P : 3-1-0

Pre-requisite: Elementary Algebra and Calculus.

Course Objectives: This course gives a foundation for the basic concepts in probability theory and statistics. It will also focus on the random variable, some important probability distributions, correlation, and regression.

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand data, population and sample, classification and graphical representations of data. Compute and interpret measures of central tendency and dispersion of data.	Familiarity
CO-2	Construct sample spaces of random experiments; identify and specify events, and perform set operations on events. Compute and apply Baye's theorem to simple situations.	Familiarity
CO-3	Express the features of discrete and continuous random variables, CDF, PMF. Understand the concepts of mathematical expectation, mean, variance and MGF.	Assessment
CO-4	Understand different discrete and continuous probability distributions with applicability.	Usage
CO-5	Compute correlation coefficient and rank correlation coefficient. Understand simple linear and multiple regressions, nonlinear regression with interpretation.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Basics of Statistics: Population, Sample, Attribute and Variable (Discrete and Continuous), Classification and Tabulation of Data. Graphical Representation of Data: Histogram, Frequency Polygon, Frequency Curve. Descriptive statistics: Measures of Central Tendency – Mean, Median, Mode. Dispersion and its Measures: Range, Quartile Deviation, Mean Deviation, Standard Deviation, Skewness and Kurtosis.	10
2	Probability: Random Experiment, Sample Space, Event, Types of Events. Three Approaches to Probability, Additive and Multiplicative Laws Of Probability, Conditional Probability, Total Probability Theorem and Bayes' Theorem.	7

3	Random Variables: Introduction: Probability Mass Function (PMF), Probability Density Function (PDF) and Cumulative Distribution Function (CDF)., Mathematical Expectation, Moments of Random a Variable – Mean and Variance. Moment Generating Function of a Random Variable (Definition & Properties).	7
4	Probability distributions: Binomial, Poisson distribution; Uniform, Exponential, Gamma and Normal distributions.	6
5	Correlation and Regression: Bivariate Data, Scatter Plots. Karl Pearson's Correlation Coefficients, Spearman's Rank Correlation Coefficients, Properties of Correlation Coefficient, Curve Fitting- Method of Least squares, Simple Linear Regression, Multiple Linear Regression, Nonlinear Regression.	12
Total Lectures		42

Suggested Text Book(s):

1. Richard A. Johnson Irwin Miller and John E. Freund, ``Probability and Statistics for Engineers'', PrenticeHall, New Delhi, 11th Edition, 2011.
2. Sheldon M. Ross, ``Introduction to Probability and Statistics for Engineers and Scientists'', Academic Press, (2009).
3. Ronald E. Walpole , Raymond H. Myers , Sharon L. Myers and Keying E. Ye, ``Probability and statistics for engineers and scientists'', 9th Edition, Pearson, 2011.
4. Jay L. Devore, ``Probability and statistics for engineering and the sciences'', Cengage Learning, 8th Edition, 2011.
5. Oliver C. Ibe, ``Fundamentals of applied probability and random processes'', Academic press, 2005.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes(2) – 10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Probability and Statistics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	3	3	3	1	4	3	4	3	2.5
CO-2	3	2	1	1	1	3	1	1	1	2	3	3	1.8
CO-3	3	2	1	3	1	1	3	1	2	3	2	3	2.1
CO-4	3	2	1	1	1	1	3	1	2	2	2	3	1.8
CO-5	3	1	1	4	3	3	3	1	4	3	4	3	2.8
Average	3	1.6	1	2	1.8	2.2	2.6	1	2.6	2.6	3	3	

FUNDAMENTAL OF PROBABILITY AND STATISTICS

COURSE CODE: 22BS1MA212

COURSE CREDITS: 4

CORE/ELECTIVE:

L-T-P : 3-1-0

Pre-requisite: Elementary Algebra and Calculus.

Course Objectives: This course gives a foundation for the basic concepts in probability theory and statistics. It will also focus on the random variable, some important probability distributions, correlation, and regression.

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand data, population and sample, classification and graphical representations of data. Compute and interpret measures of central tendency and dispersion of data.	Familiarity
CO-2	Construct sample spaces of random experiments; identify and specify events, and perform set operations on events. Compute and apply Baye's theorem to simple situations.	Familiarity
CO-3	Express the features of discrete and continuous random variables, CDF, PMF. Understand the concepts of mathematical expectation, mean, variance and MGF.	Assessment
CO-4	Understand different discrete and continuous probability distributions with applicability.	Usage
CO-5	Compute correlation coefficient and rank correlation coefficient. Understand simple linear and multiple regressions, nonlinear regression with interpretation.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Basics of Statistics: Population, Sample, Attribute and Variable (Discrete and Continuous), Classification and Tabulation of Data. Graphical Representation of Data: Histogram, Frequency Polygon, Frequency Curve. Descriptive statistics: Measures of Central Tendency – Mean, Median, Mode. Dispersion and its Measures: Range, Quartile Deviation, Mean Deviation, Standard Deviation, Skewness and Kurtosis.	10
2	Probability: Random Experiment, Sample Space, Event, Types of Events. Three Approaches to Probability, Additive and Multiplicative Laws Of Probability, Conditional Probability, Total Probability Theorem and Bayes' Theorem.	7

3	Random Variables: Introduction: Probability Mass Function (PMF), Probability Density Function (PDF) and Cumulative Distribution Function (CDF)., Mathematical Expectation, Moments of Random a Variable – Mean and Variance. Moment Generating Function of a Random Variable (Definition & Properties).	7
4	Probability distributions: Binomial, Poisson distribution; Uniform, Exponential, Gamma and Normal distributions.	6
5	Correlation and Regression: Bivariate Data, Scatter Plots. Karl Pearson's Correlation Coefficients, Spearman's Rank Correlation Coefficients, Properties of Correlation Coefficient, Curve Fitting- Method of Least squares, Simple Linear Regression, Multiple Linear Regression, Nonlinear Regression.	12
Total Lectures		42

Suggested Text Book(s):

1. Richard A. Johnson Irwin Miller and John E. Freund, ``Probability and Statistics for Engineers'', PrenticeHall, New Delhi, 11th Edition, 2011.
2. Sheldon M. Ross, ``Introduction to Probability and Statistics for Engineers and Scientists'', Academic Press, (2009).
3. Ronald E. Walpole , Raymond H. Myers , Sharon L. Myers and Keying E. Ye, ``Probability and statistics for engineers and scientists'', 9th Edition, Pearson, 2011.
4. Jay L. Devore, ``Probability and statistics for engineering and the sciences'', Cengage Learning, 8th Edition, 2011.
5. Oliver C. Ibe, ``Fundamentals of applied probability and random processes'', Academic press, 2005.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes(2) -10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Probability and Statistics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	3	3	3	1	4	3	4	3	2.5
CO-2	3	2	1	1	1	3	1	1	1	2	3	3	1.8
CO-3	3	2	1	3	1	1	3	1	2	3	2	3	2.1
CO-4	3	2	1	1	1	1	3	1	2	2	2	3	1.8
CO-5	3	1	1	4	3	3	3	1	4	3	4	3	2.8
Average	3	1.6	1	2	1.8	2.2	2.6	1	2.6	2.6	3	3	

Data Structures and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 4

CORE/ELECTIVE: CORE

L-T-P : 3-1-0

Pre-requisites: C/C++

Course Objectives:

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

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	7

2	Stacks: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	5
3	Queues: ADT queue, Types of Queues: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues: Algorithms and their analysis.	5
4	Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	8
5	Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	6
6	Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	6
7	Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	5
Total lectures		42

Suggested Text Book(s):

1. “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. “Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. “How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education.
3. “Data structures and Algorithms Made Easy” 5th edition by Narasimha Karumanchi, Career monk publications
4. “Data Structure and Algorithms in C” 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

1. Link to NPTEL course contents: <https://nptel.ac.in/courses/106102064/>
2. Link to topics related to course:
 - a. https://onlinecourses.nptel.ac.in/noc18_cs25/preview
 - b. <https://nptel.ac.in/courses/106103069/>
 - c. <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

Introduction to Object-Oriented Programming

COURSE CODE: 22BS1CI211

COURSE CREDITS: 4

CORE/ELECTIVE: Core

L-T-P : 3-1-0

Pre-requisite: None

Course Objectives: This course gives a foundation on applied algebra concepts, and emphasizes

1. To explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
2. To strengthen their problem-solving ability by applying the characteristics of an object oriented approach.
3. To analyze and decompose problem specifications from Object Oriented Perspectives and represent the solution.
4. To introduce object-oriented concepts in C++.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem	Familiarity
CO-2	Demonstrate the concept of constructors and destructors. And create new definitions for some of the operators; create function templates, overload function templates	Assessment and Usage
CO-3	Understand and demonstrate the concept of data encapsulation, inheritance, polymorphism with virtual functions	Assessment and Usage
CO-4	Demonstrate the concept of exception handling, file operations, streams in C++ and various I/O manipulators	Assessment and Usage

Course Contents:

Unit	Contents	Lectures
1.	Fundamental Concepts: Overview of C++, Sample C++ program, Different data types, operators, expressions, and statements, arrays and strings, pointers & function components, recursive functions, user -defined types, function overloading, inline functions.	10
2.	Classes and Objects: Constructors, Destructors, friend functions, Parameterized constructors, Static data members and functions, Arrays of objects, Pointers to objects, this pointer, and reference parameter, Friend Functions, Constant member functions, and Static members (static data and static member functions). Dynamic allocation of objects, copy constructors, Operator overloading using friend functions, overloading.	12
3.	Inheritance: Base Class, Inheritance and protected members, protected base class inheritance, inheriting multiple base classes, Constructors, Destructors and Inheritance, passing parameters to base class constructors, Granting access, Virtual base classes. Virtual function, calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	10
4.	Exception and File Handling: Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, I/O System Basics, File I/O: Exception handling fundamentals, Exception handling options. C++ stream classes, Formatted I/O, stream and the file classes, Opening and closing a file, Reading and writing text files.	10
Total Lectures		42

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group.
2. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2011.
3. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill.

Suggested Reference Book(s):

1. Stroustrup B., The C++ Programming Language, Addison Wesley.
2. Stanley B.Lippmann, JoseeLajoie: C++ Primer, 4th Edition, Addison Wesley, 2012.

LIFE SKILLS AND EFFECTIVE COMMUNICATION

COURSE CODE: 21B11HS211

COURSE CREDITS:1

CORE/ELECTIVE: CORE

L-T-P: 1-0-0

Pre-requisite: None

Course Objectives:

1. Define their life and career goals.
2. Learn Self-Motivation and leadership skills
3. Analyze and Know EQ and CQ levels and utilize them in team building
4. Develop communication (speaking and writing) and Listening skills
5. Develop creativity and critical thinking

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Know your Perception and Attitude	Familiarity
CO-2	Access your Motivation levels and Leadership skills	Assessment
CO-3	Assess Emotional Intelligence	Assessment
CO-4	Develop effective communication and listening skills	Usage
CO-5	Enhance critical thinking	Usage

Subject Code		Semester	2
Subject Name	Life Skill and Effective Communication		
Credits	01	Contact Hours	14
Course Coordinator	Dr Tanu Sharma		

Course Contents:

Sr No	Content	Lectures required
Module 1	Life Skills	
1	Understanding The Self/ Individual- Ability, Perception, Attitude, Personality(Big five model)	1
2	Self-Motivation and Goal Setting- Concept of Motivation, Key Elements, Theory of Motivation, Goal setting Theory	1
3	Time Management- Importance of time management, time management matrix, dealing with procrastination	1

4	Being Emotionally Intelligent- What is Emotional Intelligence, Dimensions of Emotional Intelligence, Models of Emotional Intelligence , Emotional Intelligence in workplace, Improve your Emotional Intelligence	1
5	Assertive Communication and Persuasions skills Define Assertiveness, The art of persuasion, From persuasion to negotiation	1
6	Group Dynamics- Group Process Components, Characteristics of a Group, Group Performance, Ethical and legal considerations related to group work	1
7	Leadership and Team Management- Define leadership, Leadership Styles, Developing Leadership, Defining Teams, Types of Team, Team Processes, Decision making in a team	2
8	Creative and Critical Thinking Defining and measuring creativity, models of creativity, creativity at the workplace, creativity enhancing activities, creativity-critical thinking- problem solving	1
Module 2	Effective Communication	
9	Interpersonal Barriers in Communication and how to effectively overcome them	1
10	Studying and understanding Non-Verbal communication – Kinesis, Paralanguage, Haptics, , interpreting nonverbal cues	1
11	Active Listening – A trait of a good leader	1
12	Technical writing - technical details into well structured documents, Writing , Correspondence and Job descriptions	2
Total lectures		14

Methodology

The course follows a teaching-learning method with classroom discussions and activities on fundamental concepts on skill development of students with regard to speaking, listening and, logically interpreting ideas into words and reasoning in the classroom.

Suggested Text Book(s):

1. Stephen P. Robbins ,Organizational Behavior
2. Anthony Baker, Time Management. Managing Your Time Effectively
3. Daniel Goleman, Emotional Intelligence: Why It Can Matter More Than IQ
4. Kenneth H. Blanchard , Spencer Johnson,The One Minute manage
5. Ed Catmull, Amy Wallace, Creativity, Inc.: Overcoming the Unseen Forces That Stand in the Way of True Inspiration

Suggested Reference Book(s):

1. Working with Emotional Intelligence, Daniel Goleman
2. Organizational Behavior, K. Aswathappa
3. Organizational Behavior An Introduction, Christine Cross Ronan Carbery

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus

LIFE SKILLS AND EFFECTIVE COMMUNICATION LAB

COURSE CODE: 21B17HS271

COURSE CREDITS:1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Develop attitude and self awareness
2. Learn Self-Motivation and leadership skills
3. Develop communication (writing and speaking) and Listening skills
4. Develop Emotional intelligence and team working ability
5. Develop creativity and critical thinking

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Know your Perception and Attitude	Familiarity
CO-2	Access your Motivation levels and Leadership skills	Assessment
CO-3	Assess E Q a n d T e a m w o r k	Assessment
CO-4	Develop effective communication and listening skills	Usage
CO-5	Enhance critical thinking	Usage

Subject Code		Semester	2
Subject Name	Life Skill and Effective Communication lab		
Credits	01	Contact Hours	28
Course Coordinator	Dr Tanu Sharma		

Course Content

GD Activ ities	Topc	Activities =language lab and GD	Hours	Evaluation
1	Self-awareness	a)MBTI- Personality Test ---Measure, Assessment, Discussion b)Video on Personality Development --- Discussion and Reporting	2	5
2	Being Emotionally Intelligent	Emotional Intelligent Test --- Measure, Assessment, Discussion Talk by Daniel Goleman https://youtu.be/0yGNhCaKJKk https://youtu.be/FKjj1tNcbtM ---- Discussion and Reporting	2	5
3	Group Dynamics	Group activity – Desert Island	2	
4	Leadership and Team Management	Team Building Activities/ Case study / Role play on leadership	2	5

		https://wikispaces.psu.edu/display/PSYCH484/Goal+Setting+Case+Study Discussion, analysis, and assessment		
5	Creative and Critical Thinking	Creativity Quotient – Measure and Discussion a) The Research Response Exercise- Take the following argument:- <i>Pesticides harm the environment more than they're worth.</i> b) Make An “Argument Map” Read about how leaders face and resolve challenges- Report submission	2	5
6	Effective Communication	a) Advanced Phrasal verbs b) Advanced Past perfect Software: Tense Buster	2	
7	Non –Verbal Communication	Role Play on Body Language How to kill your body language Frankenstein (Run time: 16:36 mins) - Discussion, analysis, Role Play, Reporting	2	5
8	Listening skills	a) A Case for Active Listening Jason Chare at TED Tokyo teachers (Run time 15:24 mins.) Discussion, Analysis and reporting b) https://agendaweb.org/listening/audio-activities-5.html Audio activity – Notting Hill Scene 1		5
9	Etiquettes and Manners	https://youtu.be/LR1TroBTlwA , https://youtu.be/svzTEUxs3A8 Discussion and reporting		5
10	Persuasive Communication	a) Shashi Tharoor (Run time:19:22 mins.) Discussion , analysis and reporting b) https://www.skillsconverged.com/FreeTrainingMaterials/tabid/258/articleType/CategoryView/categoryId/140/Persuasion-Skills.aspx		
11	Group wise activities : Groups made according to diagnostic Test	Group 1 – and Group 2 a) Intermediate - <u>The Passive</u> b)Intermediate- <u>Question Tags</u> Software: Tense Buster Group 3 and Group 4 a)Speaking Exercise -GD / brainstorming	1 1 2	
12	Group wise activities : Groups made according to diagnostic Test	Group 1 – and Group 2 a)Intermediate, <u>Equality</u> Case study b) Intermediate <u>Relative Clauses</u> Software: Tense Buster Group 3 and Group 4 Case study on Team building	1 1 2	

Environmental Science and Technology

COURSE CODE:18B11GE411

COURSE CREDITS: AUDIT

CORE/ELECTIVE: CORE

L-T-P : 2-0-0

Pre-requisite: None

Course Objectives:

1. Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
2. Estimate the population- economic growth, energy requirement and demand.
3. Analyze material balance for different environmental systems
4. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
5. Identify the major pollutants and abatement devices for environmental management and sustainable development.
6. Recognizing the major concepts of environmental studies, developing problem solving ability, forecasting the global climate change

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Introducing basic concept of environmental studies, interdisciplinary nature and scope of the subject	Familiarity
CO-2	Understanding ecosystem services and its functioning as well as equitable use of natural resources.	Assessment
CO-3	Understanding Pollution, A threat to the environment and finding its solutions, Pollutant sampling and monitoring of samples.	Assessment
CO-4	Correlating the concept of Biodiversity and its importance to human mankind	Usage
CO-5	Understanding social issues and their impact on environment.	Usage
CO-6	Role of Information Technology in environment and human health	Usage

Course Contents:

Unit	Contents	Lectures required
1	Unit 1: Multidisciplinary nature of environmental studies: The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles.	3

2	Unit 2: Natural resources, their consumption & Protection: Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.	4
3	Unit 3: Pollution- a threat to environment: Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains	4
4	Unit 4: Environmental standards & Quality: Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems. Green Chemistry and its applications	3
5	Unit 5: Biodiversity and its conservation: Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity	4
6	Unit 6: Social Issues and the Environment: Waste land reclamation, consumerism and waste products, eco-consumerism, dematerialization, green technologies, eco-tourism. Water conservation, rain water harvesting, watershed management. Environment protection act, Air (prevention and control of population) act; Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities.	4
7	Unit 7: Human Population and the environment: Population growth, variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in environment and human health. Case Studies.	4
8	Unit 8: Field work: Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	4
Total lectures		30

Suggested Text Book(s):

1. Environmental Studies By: M. P. Poonia and S.C. Sharma, Khanna Publishers
2. Textbook of Environmental Studies for UG Courses –ErachBharucha, University Press
3. Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India.

Suggested Reference Book(s):

1. Nebel, B.J. & Wright, R.T., 1993, Environmental Science, 8th Edition, Prentice Hall, USA.
2. Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6th ed. Jones &Barlett Publishers.
3. David Laurance. 2003. Environment Impact assessment, Wiley publications.
4. Chhokar KB, Pandya M & Raghunathan M. 2004. Understanding Environment. Sage publications, NewDelhi.

Other useful resource(s):

1. Issues of the journal: Down to Earth, published by Centre for Science and Environment.
2. Audio visuals from: Discovery, National Geographic etc.
3. Rachel Carson 1960. Silent springs

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Environmental Science)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2.0
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	3	3	2	2	1	1	1	1	1	3	2	1.8
CO-6	2	2	2	2	1	1	1	2	2	2	2	2	1.8
Average	2.0	2.5	2.5	2.3	2.2	1	1	1.2	1.8	2.0	1.8	2	

Data Structures and Algorithms-Lab

COURSE CODE: 18B17CI271

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P : 0-0-4

Pre-requisites: None

Course Objectives:

1. Develop problem solving ability using Programming
2. Develop ability to design and analyze algorithms
3. Introduce students to data abstraction and fundamental data structures
4. Develop ability to design and evaluate Abstract Data Types and data structures
5. Apply data structure concepts to various examples and real life applications

Course outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type	Familiarity
CO-2	To have hands on skills to evaluate different kinds of linked lists and their applications in day-to-day problem solving.	Usage
CO-3	To have hands on skills to evaluate different kinds stacks and their applications and implementations in day-to-day problem solving	Assessment
CO-4	To have hands on skills to evaluate different kinds queues and their applications and implementations in simulations.	Assessment
CO-5	To acquire knowledge of various sorting algorithms	Usage
CO-6	To learn Searching: Balanced tree, red-black tree, lower bounds for searching	Usage
CO-7	To learn to code for operations on Tree or BST (Creation; Traversing like pre-order, post-order and in-order; Searching element; finding height etc.)	Usage
CO-8	Introduction to Heaps	Usage
CO-9	To learn to code for operations on Graphs (Creation; entering info, printing output and deleting; traversal of BFS and DFS algorithm)	Assessment

List of Experiments:

S.No.	Description	Hours
1	Getting acquainted with a) Arrays and Strings, Structures, b) Recursion, Pointers c) Dynamic memory allocation	2 4 4
2	Operations on: (Creation, insertion, deletion, sorting, traversing, reversing etc) a) Linear Linked List, b) Doubly and c) Circular Linked List	4 4 2
3	Operations on Stacks: a) Creation; pushing; popping; b) testing underflow, overflow; c) prefix and postfix	4 2 2
4	Operations on Queues: a) Creation; b) enqueue; dequeue; c) testing underflow, overflow	4 2 2
5	Operations on Tree or BST: Creation; a) Traversing like pre-order, post-order and in-order; b) Searching element; finding height etc.	4 2
6	Implementation of sorting algorithms 1: Insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation.	2
7	Implementation of sorting algorithms 2: Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation.	2
8	Implementation of sorting algorithms 3: Implementation of Radix Sort and Quick Sort Algorithm with arrays using dynamic memory allocation.	2
9	Operation on Heaps: a) Heaps, b) Heap Sort	2 2
10	Implementation of Searching algorithms: Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation.	2
11	Operations on Graphs: (Creation; entering info; printing Output and deleting; traversal of BFS and DFS algorithm etc.)	2
Total Lab hours		56

Minor Project(s) – (Only for 2 credit lab)

- Design GUI based program to solve any binary equation.
- Design GUI based program to find the roots of quadratic equation.
- Design a program that picks the characters at equal interval from the given text/paragraph and generate a new paragraph in which each set of word can't have more than 4 characters. Last word of the paragraph can have <=4 characters.
- Program to input following data into disk file. Code, name, department and salary of employee in a firm. After creating file read the file and find following-
Methodology
algorithms
Code execution
Future scope
Count number of employees as per department
Search record of employee
Display record of employee
Display list of employees in alphabetical order as per department
Read record from file

Suggested Books/Resources:

1. Langsam, Augenstein, Tenenbaum: Data Structures using C and C++, 2nd Edn, 2000, Horowitz and Sahani: Fundamental of Data Structures in C, 2nd Edn, 2008
2. Weiss: Data Structures and Algorithm Analysis in C/C++, 3rd Edn, 2006
3. Sahani: Data Structures, Algorithms and applications in C++, 1997.
4. Corman et al: Introduction to Algorithms, 3rd Edn., 2009
5. <http://www.nptel.iitm.ac.in/video.php?subjectId=106102064>, last accessed Mar 13, 2014.
6. http://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html, last accessed Mar 13, 2014.
7. <http://courses.cs.vt.edu/csonline/DataStructures/Lessons/index.html>, last accessed Mar 13, 2014.
8. Link to topics related to course:
 - a. <http://cse.iitkgp.ac.in/~pallab/pds16/pds16.htm>
 - b. <https://onlinecourses.nptel.ac.in/programming101/preview>

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	2	2	3	3	3	2	3	2	2	2.5
CO-2	3	3	3	2	3	3	3	3	2	3	2	3	2.8
CO-3	3	3	3	2	2	3	3	3	3	3	2	2	2.7
CO-4	3	3	3	3	3	3	3	2	2	3	3	3	2.8
CO-5	3	3	3	2	2	2	3	3	3	3	2	2	2.6
CO-6	3	3	3	3	3	3	3	2	2	3	3	3	2.8
CO-7	3	3	3	3	3	3	2	2	3	3	3	3	2.8
CO-8	3	3	3	2	3	3	3	3	3	3	2	3	2.8
CO-9	3	3	2	3	3	3	3	3	3	2	3	3	2.8
Average	3	2.9	2.9	2.4	2.7	2.9	2.9	2.7	2.6	2.9	2.4	2.7	

Lab-Introduction to Object-Oriented Programming

COURSE CODE: 22BS7CI271

COURSE CREDITS: 1 (L-0 T-0 P-2)

CORE/ELECTIVE: Core

Pre-requisite: None

Course Objectives: This course gives a foundation on applied algebra concepts, and emphasizes

1. To explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
2. To strengthen their problem-solving ability by applying the characteristics of an object-oriented approach.
3. To analyze and decompose problem specifications from Object Oriented Perspectives and represent the solution.
4. To introduce object-oriented concepts in C++.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO 1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors.	Usage
CO 2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO 3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-level Inheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO 4	To learn the concept of Abstract classes.	Usage
CO 5	To learn the concepts of Operator overloading and conversion function	Usage
CO 6	To learn the Exception Handling: try --catch and finally block, making user defined exceptions.	Usage
CO 7	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage

List of Experiments:

S. No.	Description	Hours
1.	Write a program that uses a class where the member functions are defined inside a class.	2
2.	Write a program that uses a class where the member functions are defined outside a class.	2
3.	Write a program to demonstrate the use of static data members.	2
4.	Write a program to demonstrate the use of const data members.	2

5.	Write a program to demonstrate the use of zero argument and parameterized constructors.	2
6.	Write a program to demonstrate the use of dynamic and explicit constructor.	2
7.	Write a program to demonstrate the overloading of increment and decrement operators.	2
8.	Write a program to demonstrate the overloading of memory management operators.	2
9.	Write a program to demonstrate the use of conversion function.	2
10.	Write a program to demonstrate usage of abstract classes.	2
11.	Write a program to demonstrate the multiple inheritances.	2
12.	Write a program to demonstrate the runtime polymorphism.	2
13.	Write a program to demonstrate the exception handling.	2
14.	Write a program to demonstrate the reading and writing of mixed type of data.	2
Total Lab Hours		28

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group.
2. Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2011.
3. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill.

Suggested Reference Book(s):

1. Stroustrup B., The C++ Programming Language, Addison Wesley.
2. Stanley B.Lippmann, JoseeLajoie: C++ Primer, 4th Edition, Addison Wesley, 2012.

EvaluationScheme:

S. No.	Exam	Marks
1.	Mid Sem. Evaluation	20 Marks
2.	End Sem. Evaluation	20 Marks
3.	Attendance	15 Marks
4.	Lab Assessment	45 Marks

