BSc. BCA 2ND SEMESTER (NEP 2020)

SUBJECT CODE	SUBJECT NAME
MAJOR-P-3	Data Structures
MAJOR-P-4	OPPS Using C++
MINOR-2-P-2	Probability and Statistics
MDC-2	Environmental Education
AEC-2	English
SEC-1	Analytical Thinking & Logical Reasoning

SEMESTER-II

Core-III Data Structures

Course Objectives:

- To understand different ways of organizing data in computer's memory.
- To learn different operations on data structures.
- To explore different applications of data structures.

Learning Outcomes:

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

1. Learn about data structures and the use of array
2. Create linked lists and perform insertion/deletion operations on them
3. Represent Stack and Queue in the memory and learn their applications
4. Learn the use of various non-linear data structures and their applications

Unit-I:

Introduction to Data Structures: Definition, Concepts, Classification of Data Structures.
Array: Introduction, One-Dimensional Array, Memory representation, Operations: Traversing, Searching, Insertion, Deletion, Merge. Two-Dimensional Array & Memory Representation, Multidimensional Array. Linear Search versus Binary Search, Sorting: Selection Sort, Bubble Sort.

Unit-II:

Linked Lists: Definition, Single Linked List, Memory representation, Operations: Traversing, Searching, Insertion, Deletion and Merge. Double Linked List, Operations: Insertions, Deletion. Circular, Double Circular Linked list, Operations: Traversing, Insertion. Applications of Linked List, Sparse Matrix and Polynomial representations.

Unit-III:

Stack: Definition, Representation: Array and Linked List representations, Operations: PUSH, POP, STATUS. Applications: Evaluation of Arithmetic Expressions: Notations, Infix to Postfix Conversion, Evaluation of Postfix expression. Recursion (Factorial and Fibonacci), Tower of Hanoi.
Queues: Definition, Representation: Array and Linked List representations, Operations: Enqueue, Dequeue. Structures of Queue: Circular, Deque and Priority Queue. Applications of Queue

Unit-IV:
Trees: Definition, Terminologies, Binary Tree: Properties, Representations (Linear and Linked List representations). Operations: Traversal (Inorder, Preorder, Postorder), Search. Introduction to Binary Search Tree, AVL tree, M-Way Search Tree. Applications of Trees.
Graph: Definition, Terminologies, Representations (Set, Linked List, Matrix), Operations: Traversal (BFS, DFS). Applications of Graphs.

Text book:

Classic Data Structure, D. Samanta, PHI, 2/ed.

Reference Books:

- ✓ *Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Pubs.*
- ✓ *Sastry C.V., Nayak R, Ch. Rajaramesh, Data Structure & Algorithms, I. K. International*
- ✓ *Publishing House Pvt. Ltd, New Delhi.*

Core III - Lab: Data Structures

Write a C Program for the followings

1. To search an element and print the total occurrences in the array.
2. To insert and delete elements into/from appropriate position in an array.
3. To perform Binary Search.
4. To perform Bubble sort.
5. To perform Selection sort.
6. To implement linear linked list and perform operations such as traverse, search, insert, delete, and reversing the list.
7. To implement circular linked list and perform operations such as node insert and delete.
8. To implement double linked list and perform operations such as node insert and delete.
9. To represent a Sparse Matrix using linked list.
10. Polynomial representation using linked list.
11. Array and Linked list implementations of Stack and perform operations such as push, pop and status.
12. Linked list implementation of Queue and perform operations such as enqueue and dequeue.
13. Linked list implementation of Circular Queue.
14. To implement a Binary Search Tree.
15. To perform tree traversal operations.
16. To implement adjacency matrix for a given graph.
17. To perform BFS and DFS traversal.

Core IV

Object Oriented Programming using C++

Course Outcomes:

- To know about the Object-Oriented Programming concepts.
- To write object-oriented programs using C++ constructs

Learning Outcomes:

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

- Understand OOPs concepts as a programming style
- Use class/objects in programs and functions of different types
- Learn the concept of inheritance and overloading of functions and operators

Unit I:

- Principles of Object-Oriented Programming: Object-Oriented Programming (OOP) Paradigm, Basic Concepts of OOP, Benefits of OOP, Characteristics of OOPS, Object Oriented Languages, Applications of OOP.
- Introduction to C++, Difference between C & C++, Tokens, Data types, Operators, structure of C++ Program, C++ statements, Expressions and Control Structures.
- Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function.

Unit II:

- Classes and Objects: Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friend Functions.
- Constructors & Destructors: Constructors, Parameterized Constructors, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, DynamicConstructors, Destructors.

Unit III:

- Inheritance: Basics of Inheritance, Type of Inheritance, Virtual Base Classes, Abstract Classes, Member Classes, Nesting of Classes. Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions, Function Overloading, Operator Overloading.

Unit IV:

- Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.
- Files: Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, File Modes, File Pointers and their Manipulations, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling during File Operations, Command-line Arguments

Text Books:

- ✓ *E. Balgurusawmy, Object Oriented Programming with C++, 4/e (TMH).*
- ✓ *Bjarne Stroustroup, Programming - Principles and Practice using C++, 2/e, Addison-Wesley*

Reference Books:

- ✓ *Paul Deitel, Harvey Deitel, "C++: How to Program", 9/e. Prentice Hall.*
- ✓ *Herbtz Schildt, C++: The Complete reference, McGrawHill.*

Lab: Object Oriented Programming using C++

1. Write a Program for Swapping of two numbers.
2. Write a Program to find sum of four numbers using default argument passing.
3. Write a Program to find square and cube of a number using inline function.
4. Write a Program to find the factorial of a number.
5. Write a Program to find reverse of a number.
6. Write a program to find sum of four numbers using default argument passing inmember function.
7. Write a Program to find area of circle, triangle and rectangle using functionoverloading.
8. Write a program to distinguish the properties of static and non-static ata members.
9. Write a program to show the method of accessing static private member function.
10. Write a program to show the ways of calling constructors and destructors.
11. Write a program to perform ++ operator overloading using member function.
12. Write a program to perform ++ operator overloading using friend function.
13. Write a program to perform + operator overloading for two complex number addition.
14. Write a program to perform + operator overloading for string concatenation.
15. Write a program to perform single inheritance.
16. Write a program to perform multiple inheritance.
17. Write a program to create an integer array using new operator and find the sum andaverage of array elements.
18. Write a program to implement virtual destructor.
19. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
20. Write a program to Copy the contents of one file to other.

Probability and Statistics

Objective: The objective of the course is to expertise the student to the extensive role of

statistics in everyday life and computation, which has made this course a core course in all

branches of mathematical and engineering sciences.

Expected Outcome: The students shall learn probability and statistics for various random

variables, multivariate distributions, correlations and relations. He shall learn law of large

numbers and shall be able to do basic numerical calculations.

UNIT-I

Probability: Introduction, Sample spaces, Events, probability of events, rules of probability, conditional probability, independent events, Bayes's theorem, Probability distributions and probability densities: random variables, probability distributions, continuous random variables, probability density functions, Multivariate distributions, joint distribution function, joint probability density function, marginal distributions, conditional distributions, conditional density, The theory in practice, data analysis, frequency distribution, class limits, class frequencies, class boundary, class interval, class mark, skewed data, multimodality, graphical representation of the data, measures of location and variability. Population, sample, parameters

UNIT-II

Mathematical Expectation: Introduction, expected value of random variable, moments, Chebyshev's theorem, moment generating functions, product moments, moments of linear combinations of random variables, conditional expectations, the theory in practice, measures of location, dispersion

UNIT-III

Special probability distributions: Discrete Uniform distribution, binomial distribution, Negative binomial, geometric, hypergeometric, poisson, multinomial distribution, multinomial. Special probability densities; Uniform distribution, gamma, exponential, gamma, chi-square, beta distribution, normal, normal approximation to binomial, bivariate normal, Functions of random variables, distribution function technique, transformation technique-one variable, several variables, moment generating function technique,

UNIT-IV

Sampling distributions: population distribution, random sample, sampling distribution of mean, Central Limit theorem, Sampling distribution of the mean: finite populations, chi-square, t, F distributions, regression and correlation: Bivariate regression, regression equation, Linear regression, method of least squares.

BOOKS RECOMMENDED:

1. Irwin Miller and Marylees Miller, *John E. Freund's Mathematical Statistics with Applications*

(8thEdition), Pearson, Asia, 2014.

BOOK FOR REFERENCES:

l. Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to Mathematical Statistics,* Pearson

Environmental Education

Course Learning Outcomes (CLOs)

On completion of the course, the students will be able to

- Understand the natural environment, different cycles related to Ecology & Ecosystem.
- Identity different causes of Environmental Pollution, Climate Change and need for Sustainable Development.
- Acquire comprehensive knowledge about Population Ecology, population Growth and Public Health.
- Learn about Environmental Movements and Laws.
- Acquire the knowledge about State pollution Control Board and Central pollution Control Board.

Unit-I: Introduction to Environment

Learning Outcomes

LO: *Understand basic concepts of Environment , Ecology, Eco-System and Biodiversity.*

- The Environment: Atmosphere, Hydrosphere, Lithosphere, Biosphere.
- Ecology, Ecosystem, major eco-system, Biogeochemical Cycle (Carbon Cycle, Nitrogen Cycle).
- Biodiversity-Values and Services, Global Environmental Issues.

Unit-II: Climate Change and Sustainable Development

Learning Outcomes

LO: *Identify factors of pollution and climate change.*

LO: *Learn basics of wild life conservation and Sustainable Development Goals.*

- Environment Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution.
- Climate Change, causes and consequences, Natural Resources: Conservation of Natural Resources,Soil Erosion and Conservation.
- Management and Conservation of Wildlife, Sustainable Development and its Goals.

Unit-III: Population and Public Health

Learning Outcomes

LO: *Understand the correlation between population growth and issues of public health.*
LO: *Learn how to manage pandemic in modern times.*

- Population dividend and population liability.
- Population Ecology: Individuals, Species, role of different sector in managing health disaster.
- Population Growth and Control, Community, Urbanization and its effects on Society.
- Communicable Diseases, Non-Communicable Diseases, Transmission and its effects.

Unit-IV: Environmental Movements and Environmental Laws

Learning Outcomes

LO: *Trace environmental movements of India.*
LO: *Understand functions and role of Pollution Control Boards and know the basic laws of India relating to environment.*

- Environmental Movements in India: Grass root Environmental movements in India, Role of women, Environmental Movements in Odisha.
- State Pollution Control Board, Central Pollution Control Board.
- Environmental Laws: Water Act, 1974, Air Act, 1981, The Wildlife (Protection) Act,1972, Environment Protection Act 1986.

Sample Questions

1. What is meant by environment? (1 Mark)
2. Write any two causes of noise pollution. (2 Marks, Within 50 words))
3. Discuss the causes and consequences of climate change (5 Marks, Within 300 words))
4. Critically reflect on the importance and purpose of SDGs with reference to the contemporary society.(8 Marks, 500 to 800 words).

Transaction Mode:

Workshop, ICT-Lab Learning, Lecture method, Seminar, Team teaching, Tutoring, Peer group discussion, Mobile teaching, Self-learning, Collaborative learning, Co-operative learning.

Practical/ Activities

Each student is required to submit Practical/Project report/Assignments selecting any one of the following:

1. Investigation of Major sources of micro- plastic pollutants in urban habitats.
2. Detection and characterisation of major water pollutants in river water.
3. Impact of growing urbanisation on wildlife habitat.

* It will be evaluated by both internal and external examiners.

Text Books

- ✓ *Anubha Kaushik and CP Kaushik, "Perspectives in Environmental Studies", 5th edition,*
- ✓ *2016.*
- ✓ *Benny Joseph, "Environmental studies", 2nd edition, McGraw Hill Education, 2015.*
- ✓ *Basics of Environmental Studies by Dr. N. S. Varandani, Books India Publications.*

- ✓ *Disaster Management by MukeshDhunna, Vayu Education of India, Delhi Publication.*

Reference Books

- ✓ *Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications,2006.*
- ✓ *Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008.*
- ✓ *Dr. K. Mukkanti, "A Text book of Environmental Studies", S.CHAND and Company Ltd, 2009.*
- ✓ *EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.*

English

Introduction

This Course aims at providing students familiarity with all components of language learning; listening, speaking, reading, writing, grammar and vocabulary which will eventually help in development of communication skills. This is an activity-based, goal-oriented, functional course, which aims to make the students able and efficient communicators by helping them to be self-reflexive about English. This course has a predefined context of being supportive and complementary to the core courses in various disciplines. Therefore, unlike most other courses in English Communication on offer, it does not seek to build facile fluency that passes off as communicative competence. Rather, it intends to equip the students with the relevant skills of presentation and expression needed in the academic as well as in the professional domains. While reading skills exercises are meant to promote the acquisition of analytical and comprehension skills, writing skills exercises are centred on sentence construction, paragraph development and précis writing. In this course there is ample scope to build the speaking and listening skills of students with an emphasis on interactive learning and articulation.

Course Objectives

- Develop in students the required knowledge, skills, and judgement around human communication that facilitate their ability to work collaboratively with others.
- Enable the students to understand and practise different techniques of communication. Through this course, they will familiarise themselves with different types of communication. Enhance the employability of students by developing in them the required skills of communication in English, so as to enable them to: 2 i. Speak correctly, intelligibly and fluently as well as to listen and comprehend accurately when spoken to, so as to be able to communicate effectively and with confidence in a variety of social, academic and work-related situations; ii. Read and comprehend accurately the various kinds of written texts which they may be expected to deal with;

iii. Write effectively in a number of different genres (forms) of writing, relevant to social, academic and work-related needs;

- Develop interpersonal skills and the attitudes required for effective functioning in

different social and work-related situations.

- Provide cognitive and cultural enrichment through exposure to a variety of humanistic learning experiences. General Pedagogical Principles 1. Instruction will essentially be activity-based. Each session will provide a variety and range of activities, pitched at different levels of linguistic competence. Group activities will be encouraged. The links between theory and practice will constantly be exemplified and highlighted. Theoretical inputs will be provided, as far as possible, in a non-technical manner. 2. Periodical tests may be conducted to assess skills and application of theoretical principles and not recalling information from memory. The skills of Listening and

Speaking may be tested through oral examinations in the classes, depending on time and scope. 3. An inventory of available software, including audio/ audio-visual materials should be made, and the use of such materials be standardised across all colleges. If necessary, software tailored to the requirements of the program should be produced in collaboration with appropriate agencies. 4. Although portions of selected texts will be used to develop the skills, a teacher is free to use material recommended by the experts. 5. The course cannot be effectively implemented unless all instructors are properly oriented. It should be ensured that orientation programs are organised before the curriculum is implemented. Handbooks must be produced and made available to all instructors. 3 6. Workshops for the development of instructional materials by members of college faculties should be organised periodically, as a part of on-going orientation.

Attention

The course drives away the myth that communicative competence in a language is honed, built and effectively practiced by learning and mastering the grammar, phonetics of a language or appropriating the accent and structures of the native tongue. Rather it is an adaptation with equal blend of the first language and the context in collaboration with the foreign tongue achieved by suitable use of texts from literature. So the teachers as well as students are advised to use as much literary texts as possible from the texts prescribed and other sources for providing an exposure to the students to be aware of the truth that literature enables skilful communication. The examination questions will be set according to the texts and topics prescribed.

Unit-I

English Language and Communication: Introduction (9 hours)

I. Communication, its importance and factors that determine communication (sender, receiver, channel, code, topic, message, context, feedback, barriers) models of communication, the information gap principle: given and new information; information overload, redundancy and cliches, the importance of audience and purpose ii. Types of communication: horizontal, vertical, interpersonal, lateral and grapevine iii. Verbal and nonverbal communication, body language and its manifestations in different cultures, written and oral communication, bias-free communication, political correctness. iv. Styles of Communication: formal, informal and semi formal Note: The topics listed above should be introduced briefly in the theory classes. The reflections of the students' understanding may be assessed by the facilitator through exercises. The teacher/facilitator can refer to the books recommended under 'prescribed readings' for teaching and exercise purposes. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Texts

- ✓ Communicative English OSHEC Publication. Chapters: Unit-I
- ✓ Literature and Art of Communication by Asima Ranjan Parhi, Madhusmita Pati, Subhra Prakash Das and Shakina Mohol, Cambridge University Press, 2019.
- ✓ The International Encyclopedia of Communication. Malden, MA: Blackwell Publishing. (ebook) 4

Suggested Readings

- ✓ A Cognitive Approach to Language Learning. Oxford University Press Donsbach, Wolfgang. (2008).
- ✓ 'Prospect of Electronic Media as Curriculum in Non-Native Contexts', by Parhi and Dutta in I-Manager's Journal on English Language Teaching, 4(2)2014. https://files.eric.ed.gov. pdf
- ✓ 21st CenturyCommunication: A Reference Handbook. Thousand Oaks, Calif: SAGE Reference. (e-book)
- ✓ Written and Spoken Communication in English published by Orient Blackswan
- ✓ Indian English through Newspapers, A R Parhi, Concept, New Delhi, 2008.
- ✓ An Introduction to Professional English and Soft Skills by Das et al
- ✓ *Communicative Competence.* T T Panigrahi, Notion Press, India, Singapore and Malaysia
- ✓ Soft Skills for Your Career, by Kalyani Samantaray. OUP
- ✓ An Anthology of English Prose 1400–1900 Cambridge University Press 2015.

Unit-II

English Language and Communication: Listening and Speaking (9 hours)

I. Types of listening (active and passive), listening to respond (how, when and why), empathic listening and interactive listening ii. Speaking to communicate effectively: fluency, accuracy. intelligibility and clarity iii. Style of speaking in various situations:formal, informal and semi-formal, tentative and cautionary, simple and plain English iv. English pronunciation: vowel and consonant sounds, diphthong, IPA, syllable division and primary stress in words, stress shift, sentence rhythm and weak forms, contrastive stress in sentences, intonation: falling and rising tones, varieties of spoken Englishes: Standard Indian, American and British (R.P.); 'Neutral English' , newspapers, ad captions and their contribution to the shaping of Indian English as a standard language

Note: This unit does not go deep into phonetics. The objective is to train students to refer to a Learners' Dictionary to find out the correct pronunciation of words. Students will be introduced to phonemic transcription using IPA symbols in theory classes and further practice will be provided during exercises/practices.

The teacher/facilitator will include simple questions on phonemic transcription and the marking of stress in words and sentences. The teacher/facilitator can refer to the books recommended under both 'Texts' and 'Suggested Readings' for teaching and exercise purposes. He/she can refer to valid and recognised webresources and additional titles from renowned publishing houses for the same purpose.

Texts

- ✓ Communicative English OSHEC publication. Chapter-Unit I
- ✓ The Sound of English by www.pronunciationstudio.com
- ✓ 'Towards the Anti-Canon: A Brief Focus on Newspaper English in India', SHSS (Studies in Humanities and Social Sciences, UGC Care), Ed. T.R. Sharma, IIAS (Indian Institute of Advanced Study), Shimla, Vol. XIII, No.1, Summer 2006, pp.143-155. http://14.139.58.200, iias.ac.in.journals Asima Ranjan Parhi.

Suggested Readings

- ✓ The Sounds of English Around the World: An Introduction to Phonetics and Phonology Cambridge University Press
- ✓ "Listening in the Language Classroom", pp. 58 - 76 DOI: https://doi.org/10.1017/CBO9780511575945.006, Cambridge University Press, Print publication year: 2009
- ✓ An Introduction to Professional English and Soft Skills by Das et al.
- ✓ Teaching the Spoken Language. Cambridge University Press Speaking. Oxford University Press
- ✓ *Communicative Competence.*Notion Press, India, Singapore and Malaysia
- ✓ Exploring Spoken English. Cambridge University Press English Conversation. Oxford University Press
- ✓ **The English Language in India: From Racial-Colonial to Democratic", *EJBS (The European Journal of Behavioural Sciences)* 3 (1): page:8-16, Dec. 2020. DOI-10.33422/ejbs.v3i1.302**

Unit-III

English Language and Communication: Reading and Writing (9 hours)

I. Reading methods and techniques: fluency, accessing meaning, levels of competence, skimming and scanning, global and local reading, silent reading and reading aloud ii. Reading texts to understand literal, metaphorical and suggested meanings (essays, poems and stories), identifying the tone (admiring, accusatory, ironical, sympathetic, ambiguous and neutral etc.) of the writer iii. Writing process: brainstorming, pre-writing, writing and post writing, coherence, cohesion, style, iv. Writing short texts: paragraph writing; writing longer texts: literary writing, academ

II. ic writing and media writing

Note: This unit will focus on the basic principles of reading and writing as forms of communication. The teacher/facilitator may use reading material from literary texts, media writings, non-fiction prose and other written discourses. He/she needs to adopt caution in selecting the reading materials. Reading and writing are related activities. The insights gained through training in reading can be utilised for effective writing. The teacher/facilitator must refer to the chapters and topics from the books recommended under 'Prescribed Texts' for teaching and exercise purposes. From which questions will be set for the examination. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Prescribed Pieces/Texts

- ✓ *Communicative English* OSHEC Publication. Chapters:Unit-III
- ✓ From *The Winged Word,* David Greene, Macmillan.1974 and *Melodious Songs and Memorable Tales,* 2015:
- ✓ 'Daffodils' by William Wordsworth, 'When we two Parted' by Lord Byron, 'The Last Ride Together' by Robert Browning, "Self Portrait" by A K Ramanujan.
- ✓ From *The Widening Arc*. Kitab Bhavan, 2016, A R Parhi, S Deepika, P Jani :
- ✓ 'No Learning without Feeling' by Claire Needell Hollander and 'The Empty Page' by Steven Harvey, 'George V High School' by Dinanath Pathy

Suggested Readings

- ✓ The Oxford Essential Guide to Writing Oxford University Press 2000.
- ✓ An Introduction to Professional English and Soft Skills Das et al
- ✓ The Classic Guide to Better Writing: Step-by-Step Techniques and Exercises to Write Simply, Clearly and Correctly Oxford University Press, 1996
- ✓ Ways of Reading: Advanced Reading Skills for Students of Literature Routledge. 2007.
- ✓ 'Semantic Excess or New Canons? Exploring the Print Media', Journal of Media and Communication, 2010. Research Gate https://www.researchgate.net.237. A R Parhi
- ✓ An Anthology of English Prose 1400–1900Cambridge University Press 2015

Unit-IV

I. English Language and Communication: Grammar and Vocabulary (9hours) i. Grammar for meaning, multiplicity of meaning, grammar in communication ii. Stative and dynamic verbs, modals and auxiliaries, tense and time reference, aspect,voice, modality, negation, interrogation; reported questions and tag questions, complex noun phrases, concord phrasal verbs. iii. Sentence structure: simple, compound and complex, clauses, types of sentences:statement, questions, exclamations,commands iv. Functions of language,usage-oriented vocabulary, neutral vocabulary Note: The teaching of grammar and vocabulary in this unit need to be connected to communication teaching. Teachers/Instructors may select other areas of grammar for review depending on the needs. They will identify the grammatical errors commonly made by their students in speech as well as writing.

The remediation of these errors may require some explanations of grammar. Instructors should use many grammar and vocabulary related exercises and through them will provide all the grammatical information needed to explain the errors that are identified. The teacher/facilitator can refer to the books recommended under 'suggested readings' for teaching and exercise purposes. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Texts

- ✓ Communicative English OSHEC publication. Chapters: Unit-III Communicative Grammar of English by Geoffrey Leech. Routledge publications, 2002
- ✓ Oxford Practical English Usage (International Edition 2016) by Michael Swan

Suggested Readings

- ✓ The Widening Arc, Kitab Bhavan, Asima R Parhi, S Deepika, P Jani, 2016.
- ✓ Writing Skills Remapping: An Anthology for Degree Classes Orient Blackswan
- ✓ An Anthology of English Prose 1400–1900 Cambridge University Press 2015

Scheme of Evaluation

- ✓ Midterm test: 20 marks

5x1=5 (short answer, short notes, comprehension questions)
5x1=5 (Analytical, perspective-based and critical-analysis questions)
5x2=10 (activity/practice/reports/case studies/response papers/assignments etc.)

The teacher will have the flexibility of conducting internal examinations or assess the students' learning outcomes through activities, short projects, case studies etc. from all 20 marks/ in parts

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Final Examination: 80 marks

Unit1: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 2: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Analytical Thinking and Logical Reasoning

Course Objectives

- To cover various forms of reasoning including deductive, inductive, and abductive, and integrate these with critical thinking skills.
- To explore logical sequences, coding-decoding, and arrangements as key elements of logical reasoning.
- To delve into complex logical reasoning constructs such as alphanumeric series, reasoning analogies, and calendars.
- To engage with arguments involving two or more premises and utilize connectives effectively.

Learning Outcomes

- To be acquainted with using facts, evidence, rules, and principles to draw valid conclusions and make sound judgments
- Able to practice pattern recognition, spatial reasoning, and decision-making as fundamental components of analytical reasoning
- Able to apply logical reasoning to practical scenarios involving cause and effect, dices, directions, and visual reasoning
- Able to master logical constructs such as statements and assumptions, conclusions, and syllogisms

Unit-I: Analytical Reasoning
Deductive Reasoning, Inductive Reasoning, Abductive Reasoning, Critical Thinking, Pattern Recognition- Data, Sequences, Structures, Logical Reasoning, Spatial Reasoning, Causal Reasoning, Decision Making.

Unit-II: Basic Logical Reasoning Concepts
Logical Sequence Series- patterns and sequences in reasoning. Coding- Coding decoding. Arrangements-Seating arrangements and data arrangement. Blood Relations-problems related to blood relations. Input and Output Patterns. Binary Logic Problems

Unit-III: Logical Reasoning
Alphanumeric series, Reasoning Analogies, Calendars, Cause and Effect, Clocks, Cubes and cuboids, Data Sufficiency, Decision Making, Deductive Reasoning/Statement Analysis, Dices, Directions, Mirror and Water Images,

Unit-IV: Logical Statements
Two premise argument. More than two premise argument using connectives. Statement and Assumptions. Statement and Conclusions. Syllogism.