Department of Computer Science

Second Semester Syllabus
Bachelor of Computer Applications (BCA)

2020 - 21

CHRIST (Deemed to be University), Bengaluru
Karnataka, India
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SEMESTER – II

BCA221- COMMUNICATIVE ENGLISH

Total Teaching Hours for Semester: 45
Max Marks: 100 **Credits:3**

Course Objectives

This course focuses on making students understand the vitality of English as a tool in implementing and; interpreting technical and professional communication. The course aims at detecting and nurturing research skills through English for professional development. A holistic approach to recognize the fundamental role of language in technical communication is undertaken.

Nurture an enquiring spirit through English language in Technical communication
Enhance English implementation in English learning for professional purposes
Encourage students towards autonomous learning through enhanced English comprehension that go beyond the classroom

Course Outcomes

CO1: Students will demonstrate better comprehension and interpretation of technical literature
CO2: Rudimentary research aptitude through language up-gradation will be initiated
CO3: Learn the nuances of professional communication through English language

Unit-1 **Teaching Hours: 08**

Pronunciation

The most regularly used words in their field of knowledge, the most often committed mistakes and their right pronunciation will be given to the students. Applications available in this context can be made familiar to learners.

Phonetics – students can me taught phonetics through phonetic apps that enable the student to relate the symbol with the sound. They can be taught to read and transcribe words to ensure ample understanding
Commonly mispronounced words – technical vocabulary can be focused here. Audio sessions can be implemented to enable auditory retention
Common errors in grammar – cooperative language learning will help students familiarize common errors and rectifications

Unit-2 **Teaching Hours: 10**

Technical literature

Students need to learn to read and study literature of their subject. Any form of literature in context to the subject can be taken and students can be involved in these chapters mentioned below

Comprehensive questioning of procedural writings & Comprehension answering of procedural queries – through subject based literature students can be taught cognition and responding to the prescribed material through writing and speaking

Issuing of instructions – instructions being an integral part of their area of expertise, students need to be made familiar with the sequencing and of ideas and brevity of language. This can be carried out through written and spoken format.

Procedural instructions – a set of operating procedures for a piece of technical equipment can be carried out in through first through oral presentations and writing exercises

Discussion of processes, errors or glitches – going beyond the usual, students must be acquainted with dealing the nitty-gritty of technical literature. They must be taught to spell out glitches or errors to enable smooth functioning

Unit-3 **Teaching Hours: 08**

Research Orientation

An integral part of in-depth learning involves research. In this unit research will be introduced to the students. The nuances of exploratory study and their approaches will be made familiar to the students

Structure of the essay – students need to be familiarized on the format and elements that contribute to a holistic essay. Deconstruction of essays can be carried out through cooperative learning and deliberated.

Topic sentence recognition – Technical English calls for detection of topic sentence recognition of any technical literature. Students can be taught on detecting keywords and significant concepts that will aid in the process

Thesis statement identification – research publications are an integral part of technical writing. Students can be provided research articles and familiarized on the format and texture of a thesis statement

Interpretation of data – quantitative study is entirely dependent on data analysis and interpretation. The language to be used in the process can be fine-tuned for the students through case studies of the same

Comprehension, organization of ideas and execution of writing project proposal – once learners have been taught the elements of a research paper, they can be encouraged to work in groups and draft their own research paper integrating all the major elements.

Unit-4 **Teaching Hours: 06**

Analytical study

An extension of rudimentary research is present in this chapter. Students will be encouraged to analyse texts, interpret and rewrite them.

Rhetoric analysis; a comparative analysis of two texts – in context to the literature prescribed, students must be enabled to make a detailed study of the texts and chart out differences and similarities.

Critical analysis – students can be taught to scrutinise the text based on the context and produce a systematic response

Paraphrasing – in a professional atmosphere data needs to be interpreted and paraphrased. Tasks with data analysis can be used to help students comprehend the implementation of paraphrasing in the written

Unit-5 **Teaching Hours: 06**

Official Correspondence

Productive skill; writing is nurtured in this chapter. A few elements of the same was handled in the first semester. Here students will further finesse their writing skills

Official letter – the types and format of official letter can be imparted through examples. Students can be then asked to draft letters of their own. Etiquettes of letter writing, register, style and specific language phrases must be taught. H examples can be used to emphasise.

Internet correspondence – the soft skills for corresponding through email, carbon copying, blind carbon copying, salutations, register, style, format and diction must be made familiar to the students,

Resume writing – the organization of a resume along with the covering letter can be imparted to the learners through providing several samples. They can then be made to draft a resume with covering letter of their own.

Unit-6 **Teaching Hours: 07**

Speaking Skills

The previous semester dealt with a few productive oral skills. Furthering their productive expertise, speaking skills are taken into consideration. Students will be encouraged to demonstrate their skills under guidance of the teacher.

Interview – types of interviews can be elaborated to the learners. The essential language and skills required must be emphasised verbally and through case studies. Students can be encouraged to demonstrate the acquired knowledge through simulated sessions

Presentations – the critical features and language checklists must be emphasised. Introducing the topic, linking, sequencing and dealing with questions must be mad familiar. The soft skills and paralinguistic aspects can be taught through examples. Group demonstrations must be mandatory

Conference – the soft skills and language finesse required must be made clear to the students. Checklists can be provided as learning aids. Chairing sessions, targeting issues, key language, and steering the meeting is required to be acquainted. Audio visual examples can be screened and re-emphasis through practice sessions can be carried out.

Recommended Reading

1. Day, R A. Scientific English: A Guide for Scientists and Other Professionals. 2nd ed. Hyderabad: Universities Press, 2000. .
2. Meenakshi Raman and Sangeetha Sharama . 2009. Technical Communication- Principles and Practice; - Oxford University Press,
3. Jay. Effective Presentation. New Delhi: Pearson, 2009.
4. English for Effective Communication. Oxford University Press, 2013.
5. Lynch, Tony. Study Listening. New Delhi. CUP, 2008.

Evaluation Pattern

Mid Semester Exam

1	Sections	A	B
2	No. of Questions in each Sections	4	3
3	No. of Questions to be answered	5	2
4	Marks for each Question	5	15
5	Maximum marks for each Section	20	30
	Total Marks: 50		

End Semester Exam

1	Sections	A	B	C
2	No. of Questions in each Sections	6	3	2
3	No. of Questions to be answered	5	3	2
4	Marks for each Question	5	15	15
5	Maximum marks for each Section	25	45	30
	Total Marks:100			

BCA 231– BASIC DISCRETE MATHEMATICS

Total Teaching Hours for Semester: 45
Max Marks: 100 **Credits: 3**

Course Objectives
This course aims at introducing the students into the world of Discrete Mathematics. It includes the topic like Set Theory, Functions and Relations. They gain a historical perspective of the development of modern discrete mathematics and application of the same in the field of Computer Science.

Course Outcomes

CO1: Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic
CO2: Prove elementary results involving sets
CO3: Apply the different properties of injections, surjections, bijections, compositions, and inverse functions
CO4: Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and relations
CO5: Determine when a relation is reflexive, symmetric, antisymmetric, or transitive, apply the properties of equivalence relations and partial orderings, and explain the connection between equivalence relations

Unit-1 **Teaching Hours: 15**
Set Theory and Theory of Functions
Sets, Set Operations, Functions

Unit-2 **Teaching Hours: 15**
Applications of Functions and Theory of Matrices
Sequences and Summations, Cardinality of Sets, Matrices

Unit-3 **Teaching Hours: 15**
Relations
Relations and Their Properties, Equivalence Relations, Partial Orderings

Text Books and Reference Books:
[1] K. H. Rosen, *Discrete Mathematics and its Applications*, 7th ed., McGraw – Hill, 2012.

Essential Reading / Recommended Reading
[1] R.P. Grimaldi and B.V. Ramana, Discrete and Combinatorial Mathematics, An applied introduction, 5th ed., Pearson Education, 2007.
[2] D. S. Chandrasekharaiah, *Discrete Mathematical Structures*, 4th ed., India: PRISM Book Pvt. Ltd., 2012

[3] J. P. Tremblay and R. Manohar, *Discrete Mathematical Structures with Application to Computer Science*, Reprint, India: Tata McGraw Hill Education, 2008.

Evaluation Pattern

Component	Mode of Assessment	Parameters	Points
CIA I	Mid-semester Examination	Basic, conceptual and analytical knowledge of the subject	25
CIA II	Written Assignment Class test Problem working in class	Mastery of the core concepts	10
CIA III	Written Assignment Class test Problem working in class	Mastery of the core concepts	10
Attendance	Attendance	Regularity and Punctuality	05
ESE		Basic, conceptual and analytical knowledge of the subject	50
		Total	100

ESE - Question Paper Pattern

Part	Unit and No. of subdivisions to be set in the unit		No. of subdivisions to be answered	Marks for each subdivision	Max. marks for the part
A	UNIT I	4	10	3	30
	UNIT II	4			
	UNIT III	4			
B	UNIT I	4	3	7	21
C	UNIT II	5	4	7	28
D	UNIT III	4	3	7	21
				Total	100

BCA232 – STATISTICS - II FOR BCA

Total Teaching Hours for Semester: 45
Max Marks: 100 **Credits: 3**

Course Objectives

The course Statistics-II describes the concept of correlation and regression, probability distribution and testing hypothesis.

Objectives of the course are

To acquaint students with various statistical methods.
To cultivate statistical thinking among students.
To prepare students for future courses having quantitative components.

Course Learning Outcomes

Upon successful completion of the course one should be able to

Understand and analyze bivariate data with respect to their association.
Apply different distributions at the appropriate situations.
Apply various tests of hypothesis understand their interpretation.

Unit-1 **Teaching Hours: 10**

Correlation and Regression

Scatter diagram, Karl Pearson's and Spearman's' correlation coefficient - Regression and properties of regression coefficient

Unit-2 **Teaching Hours: 10**

Probability distributions

Discrete and continuous random variables - Probability mass and density functions - Expectation - Binomial, Poisson and normal distribution

Unit-3 **Teaching Hours: 12**

Sampling distribution and confidence interval

Sampling - Distribution and estimation - Parameter and statistic - chisquare t and F distributions definitions only Confidence interval Single means and difference known and unknown variances - Single proportion and difference of proportions

Unit-4 **Teaching Hours: 13**

Testing of Hypothesis

Types of hypothesis - Level of significance - Types of errors - Test for single mean and difference of means - Paired t test - Tests for proportions - Chi square test for independence of attributes

Text Books and Reference Books

[1] Berenson and Levine, *Basic Business Statistics*, New Jersey, Prentice- Hall India, 6th ed. 1996.

Essential Reading / Recommended Reading

[1] C.Montogomery and G.C.Runger, *Applied Statistics and Probability for engineers*, NewJersey,John Wiley and Sons, 3rd ed. 2003.

Evaluation Pattern

Component	**Marks**
Continuous InternalAssessment-I	10
Continuous InternalAssessment-II	25
Continuous InternalAssessment-III	10
Attendance	5
End Semester Exam(Written Test)	50
Total	**100**

End Semester Exam Pattern:

Section	Total number of questions	No. of questions to be answered	Max. Marks for each question	Total Marks
A	12	10	2	20
B	6	5	6	30
C	6	5	10	50
Total	24	19		100

BCA233 – OPERATING SYSTEMS_secondsem_syllabus20

Total Teaching Hours for Semester: 60
Max Marks: 100 **Credits: 4**

Course Objectives

This course is an introduction to the concepts behind modern computer operating systems. Topics will include what an operating system does (and doesn't) do, system calls and interfaces, processes, resource scheduling and management (of the CPU, memory, etc.), virtual memory.

Objectives of the course are

To acquire the fundamental knowledge of the operating system architecture and its components

To know the various operations performed by the operating system.

Course Outcomes

CO1: Upon completion of the course students will be able to:
CO2: Understand the basic working process of an operating system.
CO3: Understand the importance of process and scheduling.
CO4: Understand the issues in synchronization and memory management.

Unit-1 **Teaching Hours: 8**

Introduction and System Structures

Operating System Fundamentals; Computer System organization and architecture; Operating System structure and operations; Basics of process, memory and storage management and protection and security; Operating System services; User interface; System calls; System programs; Operating System structure; System boot.

Unit-2 **Teaching Hours: 12**

Process Management

Process concept; Process scheduling; Operations on processes; Inter Process Communication; Overview of Threads; Multi-threading models; Threading issues

Unit-3 **Teaching Hours: 12**

Process Synchronization

Need of synchronization; Critical section problems; Peterson‘s solution; Synchronization hardware; Mutex Locks; Semaphores, Classical problems of synchronization, Synchronization examples, Thread synchronization using mutex and semaphore.

Unit-4 **Teaching Hours: 6**

CPU Scheduling

CPU Scheduling concepts; Scheduling criteria; Scheduling algorithms; Overview of thread scheduling; Multi-processor scheduling

Unit-5 **Teaching Hours: 12**

Memory Management

Overview; Swapping; Memory allocation; Segmentation; Paging, Structure of the page table

Unit-6 **Teaching Hours: 10**

Virtual Memory

Overview; Demand paging; Copy on Write; Page replacement; Allocation of Frames; Thrashing

Self Learning

File system structure, Directory structure

Text Books and Reference Books:

[1] A. Silberschatz, P.B. Galvin and G. Gagne, Operating System Concepts.9th Edition, New Delhi: Wiley India, 2011.

Essential Reading/Recommended Reading

[1] Stalling William, Operating Systems: Internals and Design Principles. 7th Edition, Prentice Hall, 2011.

[2] Dietel et al, Operating System.3rd Edition. Pearson Education, 2004.

[3] A.S. Tanenbaum, Modern Operating Systems.3rd Ed, Prentice Hall, 2007.

BCA234 – DATA STRUCTURES

Total Teaching Hours for Semester: 60
Max Marks: 100 **Credits: 4**

Course Objectives

Data Structure is considered as one of the fundamental paper towards a more comprehensive understanding of programming and application development. Student is expected to work towards a sound theoretical understanding of Data Structures and also compliment the same with hands on implementing experience.

Objectives of the course are

To be able to practically implement the data structures like stack, queue, array etc.
To understand and implement different searching and sorting techniques.

Course Outcomes

CO1: Understand the need for Data Structures when building application.
CO2: Appreciate the need for optimized algorithm.
CO3: Able to walk through insert and delete for different data structures.
CO4: Ability to calculate and measure efficiency of code.
CO5: Appreciate some interesting algorithms like Huffman, Quick Sort, and Shortest Path etc.
CO6: Able to walkthrough algorithm.
CO7: Improve programming skills.

Unit-1 **Teaching Hours: 10**

Arrays

Introduction to data structures- Arrays and Structures: Abstract Data Type, Array in C, Dynamically Allocated Arrays, Structures, Unions, Internal Implementation of Structures, Self-Referential Structures, Polynomial Representation, Polynomial Additions.-sparse matrix

Unit-2 **Teaching Hours: 10**

Searching and String

Linear Search, Iterative Binary Search, Recursions, Recursive Binary Search, String Abstract Data Type, String in C, Pattern Matching.

Unit-3 **Teaching Hours: 09**

Stacks and Queues

Stacks- stacks using dynamic arrays- queues – circular queue using dynamic arrays- Evaluation of Expressions, Evaluating Postfix Expressions, Infix to Postfix

Unit-4 **Teaching Hours: 09**

Linked Lists

Pointers, Using Dynamically Allocated Storage, Singly Linked Lists, Dynamically Linked Stacks and Queues, Polynomials, Representing Polynomials as Singly Linked Lists, Adding Polynomials, Erasing Polynomials, Polynomials as Circularly Linked Lists, Doubly Linked Lists.

Unit-5 **Teaching Hours: 10**

Trees

Introduction, Terminology, Representation of Trees, Binary Trees, Abstract Data Type, Properties of Binary Trees, Binary Tree Representations, Binary Tree Traversals Binary Search Trees: Introduction, Searching a Binary Search Tree, Inserting an Element, Deleting an Element, Height of Binary Search Tree

Unit-6 **Teaching Hours: 12**

Sorting techniques and Graphs

Introduction, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort. Graphs—Introduction-Definition-representation-Depth first search-Breadth first search

Text Books and Reference Books:

[1] Horowitz Sahni Anderson-Freed, *Fundamental of Data Structures in C,* Universities Press, Reprint 2009.

Essential Reading / Recommended Reading

[1] Yashwant Kanetkar, *Data Structures Through C,* 9th Edition, BPB Publication 2010.

[2] Tremblay J.P and Sorenson P.G: *An Introduction to Data Structures with Applications*, 2nd Edition, 2002, TMH.

BCA251 – OPERATING SYSTEM LAB

Total Lab Hours for Semester: 60
Max Marks: 100 **Credits: 2**

Course Objectives

This lab introduces basic commands in LINUX and helps students in familiarizing the concepts of operating system through various commands related to operating system activities.

Course Outcomes

CO1: To make students able to implement various LINUX commands.
CO2: Students will also be able to implement different process related commands.

List of programs

1. To study the execution of various file/directory handling commands.
2. To study the various commands operated in vi editor in LINUX.
3. To study the various File Access Permission and different types of users in LINUX
4. To study about process related commands.
5. To study about the commands related to memory allocation of variables for a process.
6. To study about commands for viewing system calls.
7. To study about commands used for debugging.
8. Write a program to demonstrate basic operations of a process.
9. Write a program to create a Zombie process and an orphan.
10. Write a program to demonstrate a one-way pipe between two processes.
11. Write a program to illustrate a two way pipe between two processes.
12. Write a program to demonstrate a one-way communication between two processes using FIFO
13. Write a program to demonstrate a two-way communication between two processes using FIFO
14. Demonstrate process synchronization using semaphore.
15. Demonstrate the basic operations of thread.
16. Demonstrate thread synchronization using mutex.
17. Demonstrate thread synchronization using semaphore.

BCA252 – DATA STRUCTURES LAB

Total Lab Hours for Semester: 60
Max Marks: 100 **Credits: 2**

Course Objectives
The course is designed to provide a practical exposure on data structure and its applications.

Course Outcomes
Upon completion of the course

CO1: Students acquire the knowledge to build the logic and develop a solution for a problem statement.

List of programs

1. Strings:
   a) Write a menu driven program to compare, concatenate, copy strings and find the length of a string.
   b) Write a menu driven program to find the index of a pattern in a given string and to extract a substring.
2. Arrays
   a) Write a program to insert and delete an element(s) in one dimensional array.
   b) Write a program to insert and delete an element(s) in two dimensional arrays.
3. Sparse Matrix
   a) Write a menu driven program to read a sparse matrix of integer values and to search the sparse matrix for any element specified by the user.
   b) Write a program to print the appropriately triple < row, column, "value" > that represents the elements in the sparse matrix.

4. Searching Techniques:
   a) Write a program to implement Linear Search with sentinels
   b) Write a program to implement Binary Search using recursion
5. Sorting techniques:
   a) Write a menu driven program to implement insertion sort
   b) Write a menu driven program to implement selection sort.
   c) Write a menu driven program to implement quick sort using recursion
   d) Write a menu driven program to implement merge sort using recursion.
6. Singly linked list:
   a) Write a menu driven program to implement singly linked lists creation, insertion and deletion
7. Stack:
   a) Write a menu driven program to implement different operations on a stack using an array and linked list.
8. Queue:

a) Write a menu driven program to implement different operations on a queue using an array and linked list.

9. Binary search trees:
   a) Write a menu driven program to create a binary search tree and to perform Insertion and different types of traversal
10. Graphs:
   a) Write a menu driven program to implement breadth first search (bfs)
   b) Write a menu driven program to implement depth first search (dfs)

BCA212 – STATISTICS TOOL LAB

Total Lab Hours for Semester: 30
Max Marks: 50 **Credits: 1**

Course Objectives
The course is designed to provide a practical exposure on data structure and its applications.

Course Outcomes
Upon completion of the course

CO1: Students acquire the knowledge to build the logic and develop a solution for a problem statement.

List of programs

1. Calculate mean, median, mode and display results in proper format.
2. Calculate the product and sum of two vectors.
3. Calculate Range, quartile deviation, standard deviation and coefficient of variation for grouped data.
4. Partition values-quartiles for grouped and ungrouped data and display formatted results.
5. Data Base Creation (including vector, matrix, data frames).
6. Graphical representation (Bar, Pie, Line, Histogram, Scatter).
7. Cross tabulation and Descriptive Statistics.
8. Implement Correlation.
9. Perform simple Regression and show results in chart.
10. Testing of hypothesis for single mean.
11. Testing of hypothesis for comparison of means.
12. Chi-square test for independence of attributes.