DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,BHOPAL

SCHEME OF STUDIES & EXAMINATIONS (IMPLEMENTED FROM SESSION : JULY 2023)

SCHEME	NAME OF BRANCH	BRANCH CODE	SEMESTER
OCBC JULY 2022/2023	COMPUTER SCIENCE & ENGG.	C04	THIRD (III)

S.N.	PAPER CODE	SUBJECT CODE	SUBJECT NAME	THEORY COMPONENT								PRACTICAL COMPONENT					TOTAL CREDITS	TOTAL MARKS
				HRS PER WEEK	CREDITS	TERM WORK				THEORY PAPER		HRS PER WEEK	CREDITS	LAB WORK	PRACTICAL EXAM/VIVA			
						QUIZ/ASSIGNMENT	MID TERM TEST*		TOTAL	MARKS	DURATION				MARKS	DURATION		
							I	II										
1	7481	301	COMPUTER PROGRAMMING	3	3	10	10	10	30	70	03 Hrs.	4	2	20	30	03 Hrs.	5	150
2	7482	302	SCRIPTING LANGUAGES	3	3	10	10	10	30	70	03 Hrs.	4	2	20	30	03 Hrs.	5	150
3	7483	303	DATA STRUCTURES	3	3	10	10	10	30	70	03 Hrs.	4	2	20	30	03 Hrs.	5	150
4	7484	304	COMPUTER SYSTEM ORGA.	4	4	10	10	10	30	70	03 Hrs.	0	0	0	0	0	4	100
5	7485	305	ALGORITHMS	4	4	10	10	10	30	70	03 Hrs.	0	0	0	0	0	4	100
6			**SUMMER INTERNSHIP- I	0	0	0	0	0	0	0	0	0	2	20	30	03 Hrs.	2	50
7			PROFESSIONAL DEVELOPMENT	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
8			***RECOVERY CLASSES/LIBERARY etc.	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
TOTAL				17	17				150	350		19	8	80	120		25	700

NOTE - (1)* Two Best, out of Three Mid Term Tests (Progressive Tests) Marks should be entered here.

(2)** 3-4 Weeks Summer Internship after II Semester.

(3)***To recover courses if session delays due to summer internship.

GRAND TOTAL OF CREDITS	GRAND TOTAL OF MARKS
25	700

DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN COMPUTER SCIENCE & ENGINEERING (C04)

SEMESTER III

COURSE TITLE	:	COMPUTER PROGRAMMING
PAPER CODE	:	7481
SUBJECT CODE	:	301
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	02

Course Learning Objectives:

To enable student, develop structured solutions to problems and implementing them using computers. This involves two parts: i) Formulating a solution for a given problem as a well-defined sequence of actions, and ii) Expressing solution in a machine readable form or a programming language. For the second part, we will learn the common units of programming languages. The first part can only be learned through the repeated practice of solving problems.

Course Content:

The language of choice will be C. The focus will be on problem solving and problem where these ideas can be applied. The main focus of the class will to take examples of problems where these ideas can be employed.

UNIT 1:

Introduction to Problem Solving (computational way of thinking); Variables and Representation

UNIT 2:

Arithmetic, Relational, Logical and Bitwise Operators; Input, Output, Formatting and File I/O

UNIT 3:

Conditional Statements, Repeat Statements, Loops and Nested Loops

UNIT 4:

Arrays and Memory Organization, Strings, Multidimensional Arrays, Functions and Parameter Passing

UNIT 5:

Recursion and Recursive solutions

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should work on solved and unsolved problems listed in the text books. Teacher also should formulate problems and give them as assignment. This course is all about some theory and a lot of practice.

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.
7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

Course outcomes:

Student should be able to computationally formulate basic problems and write code snippets to execute them. The focus of the course as mentioned above should be on example based learning. The basic nitty gritties can be skipped, however, the application part should be clear. For instance, when to use an array, when to use loop and when to use conditional statements.

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COMPUTER PROGRAMMING LAB

Course Learning Objectives:

This Lab course is intended to practice what is taught in theory class of 'Computer Programming' and become proficient in computer programming. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

Course Content:

S.No.	Topics for Practice
1	Familiarization with programming environment (Editor, Compiler, etc.)
2	Programs using I/O statements and various operators
3	Programs using expression evaluation and precedence
4	Programs using decision making statements and branching statements
5	Programs using loop statements
6	Programs to demonstrate applications of n dimensional arrays
7	Programs to demonstrate use of string manipulation functions
8	Programs to demonstrate parameter passing mechanism
9	Programs to demonstrate recursion
10	Programs to demonstrate use of pointers
11	Programs to demonstrate command line arguments
12	Programs to demonstrate dynamic memory allocation
13	Programs to demonstrate file operations

The language of choice will be C. This is a skill course. More you practice, better it will be.

Reference Books:

1. Let Us C, Yashavant Kanetkar
2. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
3. C Programming Absolute Beginner's Guide, Dean Miller and Greg Perry
4. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India
5. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
6. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

Course outcomes:

Student should be able to write code snippets, and then compile, debug and execute them.

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SEMESTER III

COURSE TITLE	:	SCRIPTING LANGUGAGES
PAPER CODE	:	7482
SUBJECT CODE	:	302
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	02

Course Learning Objectives:

To learn how to work with a scripting language.

Course Content:

UNIT 1: Introduction, Variables and Data Types

History, Features, Setting up path, Installation and Working with Perl/Python, Basic Syntax

Understanding Perl/Python variables, Numeric data types, Using string data type and string operations, Basic Operators, Understanding coding blocks, Defining list andlist slicing, Other Data Types (Tuples, List, Dictionary -Python, Arrays, Associative Arrays/Hashes - Perl)

UNIT 2: Control Structures

Conditional blocks using if, else and elif, For loops and iterations, while loops, Loop manipulation using continue, break and else (and pass in Python), Programming using conditional and loops block

UNIT 3: Functions, Modules and Packages

Organizing Perl/Python codes using functions, Organizing Perl/Python projects into modules, Importing own module as well as external modules, Understanding Packages

UNIT 4: File I/O, Text Processing, Regular Expressions

Understanding read functions, Understanding write functions, Programming using file operations, Powerful pattern matching and searching, Power of pattern searching using regex

UNIT 5: Frameworks

Frameworks - Web2Py, Django, Ruby on Rails, Struts (any one of these or any other)

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should work on solved and unsolved problems listed in the text books. Teacher also should formulate problems and give them as assignment. This course is all about some theory and a lot of practice.

Reference Books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University
5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.
6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing
7. Practical Programming: An Introduction to Computer Science using Python 3, Paul Gries, The Pragmatic Bookshelf

Course outcomes:

At the end of the course student will be able to build program with a scripting language and will be able to learn any other scripting language on their own.

SCRIPTING LANGUAGES LAB

Course Learning Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Scripting Languages' and become proficient in scripting. Computer programming is all about regular practice. Students should work on solved and unsolved problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below.

Course Content:

S.No.	Topics for Practice
1	Practice basic coding syntax
2	Write and execute scripts based on data types
3	Write and execute Python scripts with conditionals and loops
4	Write and execute Scripts based on Functions and Modules
5	File Processing scripts
6	Write and execute Regular Expressions
7	Write and execute SQL Queries
8	Write and execute scripts using DBI
9	Develop a simple web application

Teacher may choose any one scripting language. This is a skill course. More student practice and try to find solution on their own, better it will be.

Reference Books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University Press
5. Introduction to Computation and Programming Using Python. John V. Guttag, MIT Press.
6. Beginning Python using Python 2.6 and Python 3, James Payne, Wrox publishing
7. Practical Programming: An Introduction to Computer Science using Python 3, Paul Gries, The Pragmatic Bookshelf

Course outcomes:

At the end of the course student will be able to build program with a scripting language and will be able to learn any other scripting language on their own.

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SEMESTER III

COURSE TITLE	:	DATA STRUCTURES
PAPER CODE	:	7483
SUBJECT CODE	:	303
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	02

Course Learning Objectives:

To provide strong foundation for implementing programming language to formulate, analyze and develop solutions related to various data structures problems.

Course Content:

UNIT 1:

Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Operations on Data Structures.

UNIT 2:

Linear Data Structures- Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks-Infix-to-Postfix Transformation, evaluating Postfix Expressions.

Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues-DeQueue, Circular Queue, Applications of Queues-Round Robin Algorithm.

UNIT 3:

Linked Lists: Singly Linked List, Representation in Memory, Operations on a Single Linked List, Circular Linked Lists, Doubly Linked Lists, Linked List Representation and Operations of Stack, Linked List Representation and Operations of Queue.

UNIT 4:

Non Linear Data Structures - Trees: Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals, Types of Binary Trees.

GRAPHS: Graph Terminologies, Representation of Graphs- Set, Linked, Matrix, Graph Traversals

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should work on solved and unsolved problems listed in the text books. Teacher also should formulate problems and give them as assignment. This course is all about some theory and a lot of practice.

This course is linked with a previous course on Computer Programming and a parallel course on Algorithms, hence exercises should not be done in isolation.

Reference Books:

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw-Hill Education, India.

Course outcomes:

Have a good understanding of Data Structures and its applications in algorithms.

DATA STRUCTURES LAB

Course Learning Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Data Structures', 'Algorithms' and is an extension of previous course on 'Computer Programming'. Students should work on problems listed in the text books, and the problems given by the teacher. Some of the topics that should necessary be covered in lab are listed below. This Lab course requires a good coordination between theory course in Data Structures and Algorithms.

Course Content:

S.No.	Topics for Practice
1	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2	Search operation in a given list of integers using binary search technique
3	Write a program to implement insertion sorting for a given random data
4	Write a program to implement bubble sorting for a given random data
5	Write a program to implement quick sorting for a given random data
6	Write a program to implement selection sorting for a given random data
7	Write a program to implement heap sorting for a given random data
8	Write a program to implement Hashing tables
9	Write a program to implement single linked list
10	Write a program to implement double linked list
11	Write a program to implement circular linked list
12	Write a program to Implement Stack operations using array and linked list
13	Write a program to Implement Queue operations using array and linked list.
14	Write a program to implement Breadth First Search (BFS)
15	Write a program to implement Depth First Search (DFS)
16	Write a program to implement a binary tree of integers
17	Write a program to find the minimum depth of a binary tree

Use 'C' as programming language for the purpose. This is a skill course. More student practice and try to find solution on their own, better it will be.

Reference Books:

1. Data Structures, R.S. Salaria, Khanna Book Publishing
2. Data Structures Using C, Reema Thareja, Oxford University Press India.
3. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw-Hill Education, India.

Course outcomes:

Student will be able to write programs for creating and doing different operations on various data structures. Student will be able to use/implement various algorithms learnt in the course on Algorithms. In summary student will have a good command over Data Structures and its applications in Algorithms.

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DIPLOMA IN COMPUTER SCIENCE & ENGINEERING (C04)

SEMESTER III

COURSE TITLE	:	COMPUTER SYSTEM ORGANISATION
PAPER CODE	:	7484
SUBJECT CODE	:	304
TREORY CREDITS	:	04
PRACTICAL CREDITS	:	00

Course Learning Objectives:

To have a thorough understanding of the basic structure and operation of a digital computer, its architectures and computational designs.

Course Content:

UNIT 1:

Structure of Computers: Computer Functional units, Von-Neumann architecture, Bus structures, Basic Operational Concepts, Data representation (Fixed and Floating point), Error detecting codes.

Register Transfer and Micro Operations: Register transfer, Bus and memory transfers, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, and Arithmetic logic shift unit.

UNIT 2:

Micro Programmed Control: Control memory, Address sequencing, and design of control unit.

Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Float- ingpoint arithmetic operation, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT 3:

Introduction to Microproccessor Architecture: Instruction Set Architecture design principles from programmer's perspective. One example microprocessor (Intel, ARM, etc).

UNIT 4:

Assembly Language Programming: Simple programs, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation, assembler directives, procedures and macros.

UNIT 5:

Memory and Digital Interfacing: addressing and address decoding, interfacing RAM, ROM, EPROM, programmable peripheral interface, various modes of operation and interfacing to processor, interfacing keyboard, displays, etc.

Reference Books:

1. Computer System Architecture, M. Moris Mano, Pearson/PHI, India.
2. Microprocessors Interface, Douglas V.Hall, Tata McGraw-Hill.
3. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, McGraw-Hill
4. Advanced Microprocessors and Peripherals- Architecture, Programming and interfacing, A.K.Ray, K.M.Bhurchandi, Tata McGraw-Hill, New Delhi, India.
5. Computer Organization and Design: A Hardwar/Software Interface (MIPS Edition) by Patterson and Hennessy

Course outcomes:

Have a good understanding of functioning of computer system as such and its various subcomponents. Student will be able to understand computing requirement for a specific purpose, analyse performance bottlenecks of the computing device and choose appropriate computing device for a given use case.

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SEMESTER III

COURSE TITLE	:	ALGORITHMS
PAPER CODE	:	7485
SUBJECT CODE	:	305
TREORY CREDITS	:	04
PRACTICAL CREDITS	:	00

Course Learning Objectives:

The objective of this course is to prepare the student with the algorithmic foundations of computing. A sound grasp of algorithms is essential for any computer science engineer. Almost all programming involves algorithms at some level.

Course Content:

UNIT 1: Fundamentals

Programming Models. Data Abstraction. Sets, Multisets, Stacks, Queues. Asymptotic and worst-case analysis of algorithms.

UNIT 2: Sorting

The sorting problem. Bubble sort, Selection sort, Insertion sort, Mergesort, Quicksort.

UNIT 3: Searching

Symbol Tables, Binary Search Trees, Balanced Search Trees. Hash Tables.

UNIT 4: Graphs

Definition of a directed and undirected graph. Paths, Cycles, spanning trees. Directed Acyclic Graphs. Topological Sorting. Minimum Spanning Tree algorithms. Shortest Path algorithms: Dijkstra's algorithm. Flow-based algorithms.

UNIT 5: Strings

String Sort. Tries. Substring Search. Regular Expressions. Elementary Data compression.

Reference Books:

2. Algorithms, Sedgewick and Wayne, Pearson
3. Introduction to Algorithms, Cormen, Leiserson, Rivest and Stein. MIT Press
4. Introduction to Theory of Computation, Sipser Michael, Cengage Learnng.
5. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing House

Course outcomes:

The student should be able to design basic algorithms for sorting and searching. The student should be able to understand the basic notions of time and space complexity of algorithms. The student should be able to implement sorting, searching, tree and graph algorithms in a modern computer programming language.

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SEMESTER III

COURSE TITLE	:	SUMMER INTERNSHIP - I
PAPER CODE	:	--
SUBJECT CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	02

SUMMER INTERNSHIP –

3-4 weeks summer internship after IInd Semester.

It should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/Govt. Skill Centers/Schemes.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

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SEMESTER - III

COURSE TITLE	:	PROFESSIONAL DEVELOPMENT
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	00

Course Objectives:

Following are the objectives of this course:-

(1) To learn the principles of Professional and Social ethics.
(2) To know the concept of Lifelong learning and Self-directed learning.
(3) To present self for employment.
(4) To introduce the need of industrial visits.
(5) To understand CV, Resume, Bio-data and Interview and their significance.
(6) To develop the skills of Group Discussion.

Course Content:

Unit – I Professional and Social Ethics

Professional ethics, its need and importance, general code of ethics for engineers, ethical issues for engineers.

Need and importance of social skills, social skills for better group performance, important social skills such as social perceptiveness, coordination, negotiation, persuasion etc.

Unit – II Lifelong learning and Self-directed Learning

Lifelong learning, its examples, self-directed learning, its examples, important steps in lifelong learning.

Need for planning self-directed learning, planning self-directed learning plan, examples.

Unit – III Career Planning

Importance of career planning, major career opportunities in concerned branch of engineering , study of the important career opportunities regarding qualification, knowledge, skills, experience required for them, role of personal factors like personal life style, interest areas, desires, personal preferences in career planning.

Identification and detailing of important career opportunities in relation to branch of diploma, identification and detailing of important self-personal factors and self-personal preferences, development of self-career plan.

Unit – IV Industrial Visits

Necessity of exposure to environment and practices, lectures by industry experts.

Importance of Students' industrial visits, learning through observing real life industrial systems, planning and organizing the industrial visits.

Unit – V CV, Resume, Bio-data and Interview

Need of presenting self for employment, salient features and formats of bio-data, CV, resume, comparison of the three for their merits, limitations and specific uses, study of cases and examples of bio-data, CV, resume and covering letter by all students for self of for the given cases.

Importance of employment related interviews, purpose of interview, dress code, body language and posture of interviewee, do's and don'ts for interviews, interview checklist, practice of facing employment related interviews for all students.

Unit – VI Group Discussion

Need and importance of group discussion in professional work, ideal group discussion and skills needed to effectively participate in group discussion, practice of group discussion skills.

Course Outcomes:

After completing this course, the student will be able to:-

(1) Demonstrate his/her understanding of Professional and Social ethics.
(2) Plan self-learning and self-directed learning for completing the task.
(3) Suggest an action plan for his career planning.
(4) Demonstrate his/her learning from visits to industry.
(5) Prepare CV, Resume and Bio-data along with a covering letter for a job.
(6) Effectively face an interview.
(7) Participate in Group discussion.

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