**ANNEXURE V**

**BHARATHIAR UNIVERSITY, COIMBATORE–641 046**

**POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA) – (CBCS)**

**PGDCA (Cognitive Systems)**

**(collaboration with TCS)**

**(Effective from the academic Year 2022-2023)**

# Duration of the Course

The programme shall be offered both in full-time (1 year) and part-time (2 years) in phygital mode. The first half consists of course work and laboratory work and the second half consists of project.

# Eligibility

Admission is open to all the candidates who possess a Bachelor Degree in any discipline or its equivalent from a recognized University.

# Regulations

# The general Regulations of the Bharathiar University Choice Based Credit System Programme are applicable to these programmes.

# The Medium of Instruction and Examinations

The medium of instruction and Examinations shall be in English.

# Submission of Record Note books for Practical Examinations & Project Viva-Voce.

Candidates taking the Practical Examinations should submit bonafide Record Note Books prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Practical Examinations. Candidates taking the Project Viva Examination should submit Project Report prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Project Viva-voce Examination.

Students carry out major project during the II Semester and the schedule for project review meetings are as given below:

Table: Schedule for Project Review Meetings

|  |  |  |  |
| --- | --- | --- | --- |
|  | | First Review | Second Review |
| II Semester | Major Project | Friday of first week of February | Friday of first week of April |

# Ranking

A candidate who qualifies for the PGDCA Degree Course passing all the Examinations in the first attempt, within the minimum period prescribed for the Course of Study from the date of admission to the Course and secures 1st or 2nd Class shall be eligible for ranking and such ranking will be confined to 10% of the total number of candidates qualified in that particular subject to a maximum of 10 ranks.

# Revision of Regulations and Curriculum

The above Regulation and Scheme of Examinations will be in vogue without any change for a minimum period of three years from the date of approval of the Regulations. The University may revise/ amend/ change the Regulations and Scheme of Examinations, if found necessary.

# BHARATHIARUNIVERSITY::COIMBATORE-641 046.

**PG Diploma in Computer Applications (PGDCA) Cognitive Systems Univ.Dept.**

***(Effective from the academic Year 2022-2023)***

**PGDCA**

***Scheme of Examinations***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Subject and Paper** | **L** | **P** | **Credits** | **Max Marks** |
| I | 22CSECC01 | Operating Systems | 4 | 2 | 6 | 150 |
| I | 22CSECC02 | Data Base Management Systems | 4 | 2 | 6 | 150 |
| I | 22CSECC03 | Scripting Languages | 4 | 2 | 6 | 100 |
| I | 22CSECEXX | Elective – I | 4 | 0 | 4 | 100 |
| I | 22CSECEXX | Elective – II | 4 | 2 | 6 | 150 |
| I | Self Learning | Introduction to Worksheet | 0 | 2 | 2 | 50 |
| II | 22CSECC06 | Project Work and Viva-Voce |  |  | 17 | 425 |
|  |  | Total |  |  | 45 | 1125 |

**Electives forPGDCA (CBCS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Subject and Paper** | **L** | **P** | **Credits** | **Max Marks** |
| 22CSECE01 | Python Programming | 4 | 2 | 6 | 150 |
| 22CSECE02 | Virtualisation and Cloud | 4 | 2 | 6 | 150 |
| 22CSECE03 | Software Testing | 4 | 2 | 6 | 150 |
| 22CSECE04 | Cognition and Problem Solving | 4 | 2 | 6 | 150 |

**Course Title : Operating Systems No. of Credits : 6**

**Course Code : 22CSECC01 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the operating system overview.
2. To understand the different types of operating systems, servers, DNS and administrative tools.
3. To learn using case studies in different OS**.**

**OPERATING SYSTEMS**

**UnitI**

Windows-Hardware Basics, Operating System overview and Windows, Windows 7 Essential, Client OS-Windows 7-Users and Groups-IP Configuration, Client OS-Windows 7Tools and Utilities-Client OS Windows 7- Installation-Features-Disk Management-File Systems.

**Unit II**

Server OS-Windows Server 2012 Overview-Server DNS-Zone Creation - DHCP LAB-Advanced server storage Management-server ADS concepts and FSMO-Server OS Windows Server 2012 Roles and features-Server OS Windows Server 2012 File and Print Services.

**Unit III**

Windows Server 2012 Installation– OS monitoring and managing Windows Server 2012-Server OS Windows Server 2012 DNS and DHCP- Server OS Windows server 2012 Administrative Tools and ADS

**Unit IV**

Server OS-Windows Server 2012-Storage and Backup Management-Client OS Windows 7 Devices and Printers-Server OS (practicals on these topics).

**Unit V**

Group Policy Management-ServerWindows Server 2012- File and print services-Group Policy- Server Storage Management –ServerScenario- Server OSWindows Server 2012-DNS and DHCP -Server- ADS scenario (practicals on these topics).

**Reference Books**

1. Mitch Tulloch, “Windows 7 Essential Guidance”, 2009.
2. William PanekTylor Wentworth, “Microsoft Windows 7 Administration”, Wiley Publishing, 2010
3. Charles Edge, Chris Barker EhrenSchwiebert, “Beginning MacOSX Snow Leopard Server”, 2010
4. Greg Tomsho, “Guide to Operating System”, 5th Edition, 2017.

**OPERATING SYSTEM LAB**

**Requirements**

* 4 GB RAM, Windows OS, Oracle Virtual Box, ISO Files
* Software: Windows 10, 2012 Server OS

**Exercises**

* Windows 10 Power shell scripting
* Installation of client and server OS
* Create server and play roles
* Zone creation and DHCP
* File and print services
* Devices and printers
* Group policy
* Server storage management
* Server scenario
* ADS Scenario based
* DNS and DHCP

**Course Title : Database Management Systems No. of Credits : 6**

**Course Code : 22CSECC02 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic database concepts, normalization, oracle database and data management
2. To Gain knowledge over various database models, schemes and SQL statements.

**DATABASE MANAGEMENT SYSTEMS**

**Unit I**

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – De -normalization – Another Example of Normalization.

**Unit II**

Oracle9*i: O*racle9i an introduction – SQL. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

**Unit III**

Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.

**Unit IV**

PL/SQL: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Exceptions – Types of Exceptions.

**Unit V**

PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks:Procedures – Functions – Packages –Triggers.

**Text Book**

1. Nilesh Shah*,* “Database Systems Using ORACLE”, PHI, 2nd Edition, 2011.

**Course Title : Scripting Languages No. of Credits : 6**

**Course Code : 22CSECC03 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic concepts of HTML, XML and CSS and Java Script
2. To Gain knowledge over various scripting languages.

**Scripting Languages**

**Unit I**

HTML Programming : HTML - Basic Tags - Various versions of HTML - HTML forms -HTML frames - Browser (IE, Netscape communicator, Lynx(Text)) -Browser dependent -HTML tags.

**Unit II**

CSS - Concept of Style Sheets – CSS rules – types – CSS properties ( Font, Text, Border, Margin, Color, Link, Position, Padding and List). XML – Introduction – XML Tree Structure, XML With Cascading Style Sheet - XML with Data Source Object - XML Document Type Definition and XML Schemas.

**Unit III**

Java Scripting: Introduction, Advantages, Limitations, Syntax, Comparison between Java Script and VB Script, Java Script objects, Methods, and Event, Event and Program flow, Java Script Functions.

**Unit IV**

Power shell Scripting, Meeting Windows Power shell, using the help system, Running Commands, Connecting Commands in the Pipeline, Working with Providers, Extending the Shell. Variables (User Defined, System, Environmental Variables) Power shell Operators -Filtering and Comparisons, Loops Available, Remote Control [1:1 and 1: N (Many)] , Inbuilt Security, Using Windows Management Instrumentation

Unit V

Arrays and Hash Tables, Working with Objects, Tips and Tricks Around Days Topic-Formatting (List, Table, Wide), Power shell Functions.

**Text Book**

1. Jon Duckett, “HTML & CSS: Design and Build Web Sites”, John Wiley and Sons Inc, 2011
2. MarijuHaverbeker, Eloquent Java Script (A modern introduction to Programming), 2011.
3. BrentonJ.W.Blawat, “Mastering Windows Powershell Scripting”, Packt Publishing 2015
4. Lee Holmes “The complete guide to Scripting Microsoft New Command Shell” 2010

**Course Title : Introduction to Worksheet No. of Credits : 2**

**Course Code : 22CSECC02**

**Self - learning paper**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic concepts of worksheet, mathematical functions, connecting workbooks and lookup functions
2. To Gain knowledge over various VBA concept and conditional logics.

**INTRODUCTION TO WORKSHEET**

**Unit I**

Excel Introduction-An overview of the screen, Navigation, Editing, Spreadsheet concepts and structure, Excel Interface, Customizing excel, Formatting and Proofing, Basic functions(Sum, Average, Max, Min, Count, Counta)-Absolute, Mixed and Relative referencing, Mathematical functions, Text functions, Date and Time functions.

**Unit II**

Sorting and filtering in excel, Charts in excel, Slicers, Cell references, Named ranges, Data validation- specifying a valid range of values for cells, specifying a list of valid values for cells, Specifying custom validations based on formula for a cell, Protecting and sharing work books, Connecting workbooks- Setting up links between workbooks and managing the links.

**Unit III**

Lookup functions**-**VLookup/HLookup, Index and match, Nested VLookup, Reverse Lookup, Pivot table- Creating a simple pivot table, Classic pivot table, Grouping based on numbers and dates, Calculated fields and Calculated Items. Array functions- Array with If, len, and mid functions formulas, Array with lookup functions, advanced use of formulas with Array. Excel dashboard- Planning a dashboard, Adding charts and tables to Dashboard, Adding dynamic contents to Dashboard.

**Unit IV**

EXCEL VBA- Overview of core Excel concepts: Starting with Visual Basic: What's Visual Basic About?, Visual Basic's Various Editions, The VB Programming Process.VBA Editor – Various components of the editor – Menu bar, Toolbars, Project Explorer, Code Window, Properties window, Immediate Window. Basic Macros- Recording a Macro, Watching a macro recorded. VBA Form Design and Controls, VBA Toolbox and its components and their properties, Excel Dot Notation. Properties & Methods, Objects, Excel VBA Developer Toolbar, saving a macro-enabled workbook, difference between .xlsm and .xlsb files. Declaring and defining variables, Option Explicit, Data Types, and Mathematical Operators in VBA.

**Unit V**

Conditional Logic: If, Else, Elseif, Conditional Operators (=,<,>,<=,>=,<>), Logical Operators (Not, And, Or). Strings and String Functions and Programming Loops, Sub-Routines- Private, Public, Calling a Sub from within another, calling a macro with variables. Exit Sub, Types of Msgbox, Symbol Types Tools and Techniques for Testing and Debugging : The Immediate Window - Debug Object - Categories of Bugs – Design Time, Compile time, Logical and Run time errors - Debugging Tools Excel VBA - Chart Sheets, Excel VBA and Embedded Charts, Adding Charts to an Excel VBA User Form.

**Reference Books**

1. Norean Brown, Barbara Lave, Julie Romey, Mary Schatz, Diane Shingledecker, Beginning Excel, 2017
2. [Mike McGrath](https://www.amazon.in/Mike-McGrath/e/B001JS22XU/ref=dp_byline_cont_book_1), Excel VBA In Easy Steps , 2017
3. Wayne Winston, Microsoft Excel Data Analysis and Business Modeling, Microsoft Press, 5 edition, 2016

**Course Title : Python Programming No. of Credits : 6**

**Course Code : 22CSECE01 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the Python programming techniques
2. To Gain knowledge over various problem solving techniques and Plot data using appropriate Python visualization libraries

**ELECTIVE 1 : PYTHON PROGRAMMING**

**Unit I**

Algorithmic Problem Solving: Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.

**Unit II**

Data, Expressions, Statements: Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**Unit III**

Control Flow, Functions: Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chainedconditional (if-else if-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

**Unit IV**

Lists, Tuples, Dictionaries: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, listparameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations andmethods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

**Unit V**

Files, Modules, Packages:Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file; Database connectivity.

**Text Books**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist’’, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and

updated for Python 3.2, Network Theory Ltd., 2011.

**Reference Books**

1. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, “Introduction to Computation and Programming Using Python’’, Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

**PROBLEM SOLVING AND PYTHON PROGRAMMING LAB**

**LIST OF PROGRAMS**

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

**Course Title : Virtualisation and Cloud No. of Credits : 6**

**Course Code : 22CSECE02 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic concepts of distributed systems, cloud computing concepts and AWS
2. To Gain knowledge over various virtualization and virtual machines

**VIRTUALISATION AND CLOUD**

**Unit I**

Distributed Systems:Distribute a system - Distributed algorithm - Distributed Data Stores - Distributed Computing - File Systems - Distributed Messaging - Distributed Applications – Distributed Transaction - Parallel and distributed computing - Applications.

**Unit II**

Cloud Concepts: Introduction Cloud Computing - Advantages of Cloud - Public Cloud - five essential characteristics - three service models - Four deployment models - Benefits of Cloud Computing - Cloud Vendors - Traditional Infrastructure setup and Challenges – AWS.

**UnitIII**

Virtualization : Introduction to vSphere and the Software - Defined Data Center Creating Virtual Machines - VCenter Server - Configuring and Managing - Virtual Networks Configuring and Managing Virtual Storage - Virtual Machine Management - Resource Management and Monitoring.

**Unit IV**

Virtual Machines: vSphere HA - vSphere Fault Tolerance - Protecting Data vSphere DRS - Network Scalability - vSphere Update Manager and Host Maintenance - Storage Scalability - Securing Virtual Machines.

**Unit V**

Datacenter: Data center overview -Components - Provisions - Need of Data Center - Data Center Architecture - Different Racks - Data center architecture for cloud computing - role of data center in cloud computing.

**Reference Books**

1. Jean Dollimore formerly of Queen Mary, Tim Kindberg, “Distributed Systems Concepts and Design”, 5thEdition Cambridge University, University of London
2. VenkataJosyula , Malcolm Orr , Greg Page, “Cloud Computing: Automating the Virtualized Data Center”, 1st Edition.
3. Brian J.S. Chee, Curtis Franklin Jr., “Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center”, 1st Edition.

**Course Title : Software Testing No. of Credits : 6**

**Course Code : 22CSECE03 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic concepts of software testing
2. To Gain knowledge over various selenium methods and automation frameworks

**SOFTWARE TESTING**

**Unit I**

Introduction to Automation - Planning before Automation - Introduction to Selenium - Installing Selenium Components.

**Unit II**

Using Selenium IDE - Managing User Interface Controls - Creating First Selenium Web Driver Script.

**Unit III**

Selenium Methods - Common Selenium Web Driver Methods - Verification Point in Selenium - Exploring the Features of Web Driver.

**Unit IV**

Handling Pop-up Dialogs and Multiple Windows - Working with Dynamic UI Objects- Data driven testing using TestNG - Selenium Functions, Common Questions and Tips.

**Unit V**

Reporting in Selenium - Batch Execution- Automation Frameworks - Understanding Selenium Grid.

**Reference Books**

1. AdithyaGarg, Ashish Mishra “A Practitioner’s Guide to Test Automation Using Selenium”, Tata McGraw Hill Education, 2015.
2. NavneeshGarg, “Test Automation Using Selenium WebDriver with Java”, AdactIn Group Pvt Ltd. 2014.
3. SatyaAvasarala, “Selenium Web Driver Practical Guide”, Packt Publishing, 2014.
4. Rex Allen Jones II, “Selenium Web Driver for Functional Automation Testing”, Test 4 Success, LLC. 2016.
5. David Burns,” Selenium 1.0 Testing Tools”, Packt Publishing, 2010.

**Course Title : Cognition and Problem Solving No. of Credits : 6**

**Course Code : 22CSECE04 No. of Teaching Hours : T-60, P-30**

**Course Objectives**

**To impart knowledge to make the students**

1. To understand the basic concepts of cognitive psychology
2. To Gain knowledge over various problem solving techniques, decision making, critical thinking and design thinking

**COGNITION AND PROBLEM SOLVING**

**Unit I**

INTRODUCTION TO COGNITION: Meaning cognitive processes, Development of cognitive psychology: Structuralism, Functionalism, Behaviourism, Memory Research, Gestalt Psychology, Emergence of cognitive psychology, Information Processing, Connectionism, Alternate approaches to cognitive psychology, Research Methods in Cognitive Psychology.

**Unit II**

PERCEPTUAL PROCESSES**-**Object Recognition- theories of object recognition, Bottom-Up and Top-Down Processing, Face Perception, Change Blindness. Attention: Divided attention, Selective Attentkon, Visual attention and Auditory attention. Consciousness: Varieties, Subliminal Perception. Visual Perception ¨Perceptual Organizational Processes, Multisensory interaction and Integration – Synesthesia, Comparing the senses, Perception and Action.

**Unit III**

MEMORY Working Memory: Research on Working Memory, Factors affecting the capacity of working Memory, Baddeley’s Working Memory Approach. Long Term Memory: Encoding and Retrieval in Long Term Memory, Autobiographical Memory. Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization, The Multimodal Approach, Improving Prospective Memory. Metacognition : Metamemory, TOT, Metacomprehension.

**Unit IV**

PROBLEM SOLVING, REASONING AND DECISION MAKING**:** VUCA World Problem Solving – Types of problem, Understanding the problem, Problem-Solving Approaches, Factors that influence Problem Solving. creativity. Reasoning – Inductive and Deductive Reasoning Decision Making – Heuristics in decision making – representativeness, availability and Anchoring and adjustment. The framing effect, Overconfidence in decisions, The Hindsight Bias.

**Unit V**

FUTURE SKILLS - Critical thinking, Adaptive thinking, Cognitive Load Management, Design thinking, Virtual Collaboration and Cultural Sensitivity

**REFERENCE BOOKS**

1. Matlin M.W. (2003) ‘Cognition’ 5th Edition, Wiley Publication.
2. Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology – Applying the Science of Mind. 2nd Edition, Pearson Education.
3. Benjafield J G (2007). ‘Cognition’ 3rd Edition.Oxford University Press.
4. Goldstein B.E.(2008) ‘Cognitive Psychology’ 2nd Edition, Wadsworth.

**BHARATHIAR UNIVERSITY :: Coimbatore 641 046**

**Department of Computer Applications**

**Phygital Mode**

* Phygital mode : ‘Phygital’ = physical plus digital = is a combination of classroom based teaching in Department of Computer Applications and online technology based teaching i.e. through online direct teaching, video professors, using the online materials prepared by Department of Computer Applications and industries.
* For every course (or) subject, 60% will be in physical mode (face to face classroom based teaching) and remaining 40% will be in digital mode.
* For online delivery of lectures, discussions, clarifications of doubts, special classes, WebEx class rooms or Zoomla will be used.
* Examinations will be conducted in physical mode by Bharathiar University at Department of Compuer Applications.