

**Programme Project Report (PPR)**  
**for**  
**Distance Learning Programme under School of Distance Education**

**Post Graduate Diploma in Computer Applications**  
**(PGDCA)**

**Course Co-ordinator: Pushpalatha K. P.**

*Academic support by*

**School of Computer Sciences**

**Mahatma Gandhi University**

**Kottayam, Kerala**

**Post Graduate Diploma in Computer Applications**  
**(Distance Learning Programme – Diploma Programme)**

**Programme Project Report**

Mahatma Gandhi University started the School of Distance Education in 1989 with the vision of providing the opportunity for quality education to all realms of society. Since the beginning, thousands of students have availed themselves of this opportunity for higher education to a great extent throughout Kerala. Many students outside the State have also benefited from this. But after the new directions of the UGC in 2014, the University had stopped all the Off-Campus Centres of the School of Distance Education both inside and outside the State.

Now it is the new endeavour of the School to revamp its functioning by offering different types of Diploma and Certificate programmes very relevant to contemporary society, in addition to the conventional Graduate and Post Graduate programmes. This is being done with the academic and infrastructural support of the eminent Schools and Interdisciplinary Interuniversity Centres of the University. All these Schools/ Centres have already conducted similar Programmes or Post Graduate Programmes in the same area. This Post Graduate Diploma Programme has been designed by the School of Computer Sciences and to be conducted by the School of Distance Education with the academic support the school.

School of Computer Sciences was established in the year 1990 with an objective to impart higher education and research in the field of Computer Science. The School enjoys considerable repute as a centre of learning, a reputation matched by a stimulating physical and intellectual atmosphere. Currently the School offers a second level M Sc programme in Computer Science, an M Tech in Computer Science and Technology with specialization in Communication and Network Technology, an M Phil programme in Computer Science and Ph D. The thrust areas of study and research includes Machine Learning and Pattern Recognition, Image Processing and Computer Graphics, Design and Analysis of Algorithms, Soft Computing, Data Mining, Big Data Analytics, Advanced and Wireless Networking, Internet programming, Cloud Computing and Advanced Computing Paradigms. The up to date curriculum and high standard of teaching matched with the state-of-the-art infrastructure and computational facilities of the School provide an intellectually stimulating atmosphere for the holistic development of students.

**(a) Programme's Mission & Objectives:**

**Mission:**

To create skilled IT professionals who are competent for employability/initiate IT startups thereby strengthening the nation to achieve globally dominant economy that fulfills the needs of society, by properly utilizing the School's technical infrastructure and human resources.

**Objectives:**

- Increase the availability of higher education to a greater sections of the population in particular the disadvantaged groups who are deprived of opportunities
- Provide advanced and innovative system of education of high standard through systematic and flexible process to the learners
- Use education as a life long tool for acquiring skills and knowledge

**(b) Relevance of the programme with HEI's Mission and Goals:**

Though huge number of learning facilities are provided in private and public sectors, a greater percentage of population including youth and old, employed and unemployed, are not getting enough opportunities study the various standard technical programmes due to many reasons. The nation is in need of a large number of highly skilled professional human resources with whom the nation can achieve globally dominant economy and become the pioneers of a higher education model that is not just the best in the world, but the best for the world, delivering social, economic and intellectual value par excellence. The programme proposed by the School is designed in such a way that, the learners coming from various streams, can achieve technical skills in different advanced and latest technologies in the area of computer science in a professionally competing level. This enables them to engage in the IT-enabled departments or sections of many government and private sector organizations. The professionals produced by this programme can contribute a lot to the total economy of the nation and will be able to push it to its most momentous heights. India has emerged to be the world's third largest economy – an achievement underpinned, by its unique demographic advantage, but also a prospect of the country's pioneering reforms in higher education over the past 20 years.

**(c) Nature of prospective target group of learners:**

The PGDCA programme with a duration of one year, is designed to technically professionalize the learners including youth and old, employed and unemployed.

**(d) Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence:**

This programme has a duration of one year (2 semesters) and it covers 6 courses of four credits and a Main Project of 8 credits in one year. The programme is flexible in regard to modalities and timing of teaching and learning as also the admission criteria without compromising necessary quality considerations. This programme will enable skill updation and quality education of relevance to learners, employed or unemployed, who missed the opportunities during their formal studentship age and who are located at educationally disadvantageous places. The courses of this programme need the learners to do reading and comprehending printed materials during non-contact hours and do practical assignments using laboratory of the School during the contact hours (150 hours). The timing of contact hours is flexible, mostly during holidays. Thus the syllabus shall be properly and systematically completed and examinations shall be completed within the 1 year period.

**(e) Instructional Design :**

**(i) Curriculum Design**

Duration: 1 year (2 Semesters)

The programme is of duration of 1 year (2 Semesters) which includes theory, practicals and project work. There are enough contact classes given to direct teaching and training. The assessment involves both internal and external components.

<b>Course Code</b>	<b>Course Type</b>	<b>Course Name</b>	<b>Contact Hours</b>	<b>Credits</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Total Marks</b>
SDE SKS PGD 1	Core course	Operating Systems	12	4	20	80	100
SDE SKS PGD 2	Core course	Data Structures and Algorithm Analysis	12	4	20	80	100
SDE SKS	Core	Data Base	12	4	20	80	100

PGD 3	course	Management Systems					
SDE SKS PGD 4	Core course	Internet Programming	12	4	20	80	100
SDE SKS PGD 5	Core course	Object Oriented Programming Using Java	12	4	20	80	100
SDE SKS PGD 6	Core course	Software Engineering and Project Management	12	4	20	80	100
SDE SKS PGD 7	Core course	Practical	120	4	20	80	100
SDE SKS PGD 8	Core course	Main Project	4	4	20	80	100
<b>Total</b>			<b>196</b>	<b>32</b>	<b>160</b>	<b>640</b>	<b>800</b>

**(ii) Detailed syllabi: Annexure I**

**(f) Procedure for admission, curriculum transaction and evaluation:**

The PGDCA programme with a duration of one year, is designed to technically professionalize the learners including youth and old, employed (anywhere) and unemployed. The admission procedure of this programme is based on the following eligibility criteria:

A pass in any recognized regular bachelor's Degree programme of minimum three years duration in any discipline with Mathematics at 10+2 level.

OR

A pass in any recognized Regular Bachelors Degree programme of minimum three years duration in any discipline with Mathematics/Statistics/Business Mathematics/ Business Statistics as one of the Subjects.

OR

A pass in BCA/BSc Computer Science/ BSc Information Technology/ B.Tech degree of a minimum three years duration from a recognized University.

All the courses are evaluated based on assignments/internal/external evaluation. For the Main Project, the candidate has to complete a major project work along with the two theory courses in the second semester and submit a project report and the evaluation is done based on project presentation and viva-voce.

Admission to the programme will be done by the University through a common procedure for all the programmes under the School of Distance Education. Fee structure will be decided by the University. The School will prepare an academic calendar/activity planner and will be circulated among all the learners at the time of admission itself. The academic calendar will include all the significant activities, important dates, schedule of submission of assignments, schedule of contact classes, schedule of examinations, etc.

Evaluation of the courses shall be done by the faculty themselves on the basis of internal assessment and end semester examinations. 20% of the marks will be decided by the internal evaluations and the remaining 80% by the end semester examinations which will be done by the University. The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

Each student shall be required to do one Assignment/Book Review/Debate/Seminar/Presentation of case study for each course. Assignments/Book Review after valuation shall be returned to the students. The teacher shall define the expected quality of the above in terms of structure, content, presentation and the like, and inform the same to the students.

**Grading System** will be followed for the evaluation on a ten point scale. The details of the grading system are given in the following Table.

**Percentage Equivalence of Grade:**

Range of % of Marks	Grade Letter	Performance	Grade Point
95 - ≤ 100	O	Outstanding	10
85 - < 95	A plus	Excellent	9
75 - < 85	A only	Very Good	8
65 - < 75	B plus	Good	7
55 - < 65	B only	Above Average	6
45 - < 55	C	Average	5
40 - < 45	P	Pass	4
< 40	F	Fail	0
Absent	Ab	Absent	0

‘P’ grade is required for a minimum pass in a course. The minimum GPA required for a pass in the Diploma programme is 4.

**Calculation of Grade Point Average (GPA) :**

**Credit Points for the Course** = (No. of Credits assigned for the course x Grade Point secured for that course).

**GPA** indicates the performance of a student in the programme. GPA is based on the total **credit points** earned by a student in all the courses divided by the total number of credits assigned to the courses required in the programme.

Note: GPA is computed only if the candidate passes in all the required courses (gets a minimum required grade for a pass in all the required courses as per the curriculum).

$$\text{GPA} = \frac{\text{Total credit points earned by the student from all the required courses of the programme}}{\text{Total credits of all courses required in the programme}}$$

This formula shall be printed on the Grade Card issued to the student with a note that it could be used to convert the grades into mark-percentages. (The details of the grading system as indicated above shall also be printed on the Grade Card).

#### **Conversion of GPA to Grade**

<b>GPA</b>	<b>Grade</b>
10	O
9.0 - < 10	A plus
8.0 - < 9	A only
7.0 - < 8	B plus
6.0 - < 7	B only
5.0 - < 6	C
4.0 - < 5	P
< 4	F
Absent	Ab

#### **Conversion of GPA to percentage**

$$\text{Equivalent Percentage} = (\text{GPA obtained}) \times 10$$

#### **(g) Requirement of the Laboratory support and Library Resources:**

The necessary software and the hardware support for completing the programme will be provided by the School. Library facilities of the School and the University will be extended to the learners for reference purpose as per requirements.

Mahatma Gandhi University Library and Information System consists of University Library, libraries of the Schools and 4 study centre Libraries. The University Library was established in 1989. The University Library which is situated in the main campus occupies purpose-built accommodation, and provides a variety of facilities and has a user-friendly environment. These include individual work spaces, room for group study and teaching, audio-visual access and online information retrieval system. The building of the University Library is 2000 sq.m in area consisting of the cellar, the ground floor and the first floor.

Academic as well as public users are given the facility to use the library. Special category membership is provided to journalists. The library is providing service from 8 am to 8 pm in three shift timings for its staff. The library functions on an average of 345 days in a year. The libraries of teaching departments are open during working hours of the Schools. Reading space is provided in all the three floors housing the various sections of the library. The library provides reading facility to the visually impaired users too. For this, an electronic lab custom made for visually and physically challenged users has been set up during 2016.

The University Library has a Library Advisory Committee. It is an 18 member committee with Vice-Chancellor as Chairman and University Librarian as Convener.

The library has a collection of 59,000 books, 232 journals, 2,135 Ph.D. theses and has access to 15000+ e-journals under E-Shodh Sindhu. The activities of the Library are comprehensively automated using open source library management software KOHA. OPAC, Journal Article Index, By monthly Bibliography compilation and Literature Search Service are also available

The library is a member of the INFLIBNET Centre, Ahmedabad as well as DELNET (Developing Library Network). As a member of these networks, the library provides access to the resources of other major libraries in the country. In addition to the access to UGC INFONET consortium, it has access to major online databases, such as EBSCO, ProQuest dissertations and theses, Oxford Scholarship Online, IEEE All Society Periodicals Package etc. Mahatma Gandhi University had won the State IT Award during the year 2009 in the e-learning category for its university online theses digital library. The various department libraries have a good collection of subject specific books and journals.

<b>A. MAHATMA GANDHI UNIVERSITY LIBRARY</b>	
<b>Category</b>	<b>No.</b>
Books	59000
Journals	232
Bound Journals	7500
Ph.D Theses	2135
E-Journals (in UGC-Infonet, renamed as E-ShodhSindhu)	15000
Online databases (in UGC Infonet)	11
Online Archives subscribed	185 Titles
Online databases subscribed	4



E-books	7338
DVDs: Educational Videos	293

<b>B</b>	<b>Name of School/Centre</b>	<b>Total No. of books</b>
	School of Computer Sciences	4130

**(h) Cost estimate of the programme and the provisions:**

The budget details for the programme is given in the following Table.

<b>S. No.</b>	<b>Item</b>	<b>Amount (Lakhs)</b>
1	Manpower	5
2	Study Materials	3
3	Examinations	2
4	Practical	3
	<b>TOTAL</b>	<b>13 Lakhs</b>

**Total Programme fee: Rs.13000/-**

**(i) Quality assurance mechanism and expected programme outcomes:**

The quality of the programme will be ensured through strict monitoring by an executive committee including the Co-ordinator of the programme, the subject experts, Director, School of Distance Education and Head of the School of Computer Sciences. The Co-ordinator of the programme shall ensure the regular student feedback of courses, teachers and programme in the prescribed format towards the end of the semester and the same shall be analysed to draw conclusions for effecting improvement. Periodical review meetings on the programme efficacy will be held in which the remarks of teachers on curriculum, syllabi and methods of teaching and evaluation will be given due importance. Moreover, the progress and the quality of the programme will be monitored by the

Internal Quality Assurance Cell of the University from the outcome and feedback of the learners as well as the proper documentation maintained in the Centre.

## **Annexure I**

### **1. SDE SKS PGD 1 Operating Systems**

#### **Unit I**

**Operating System:** Introduction, Operating System Services, System calls, Types of System Calls, Operating System Design and Implementation, Operating System Structure, System Boot, Process Management: Process Concepts and Scheduling, Operations on Process, Inter-process communication, Communication in client server system

#### **Unit II**

**Threads:** Multithreading models, Thread Libraries, Threading Issues, Process Synchronization- Critical section problem, Peterson's solution, Synchronization Hardware, Semaphores, Classic problem of Synchronization, Monitors, CPU Scheduling- Scheduling Criteria, Scheduling Algorithms, Load balancing, Multicore Processors, Real time CPU scheduling

#### **Unit III**

**Deadlock:** Deadlock Characterization, Methods for Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Main memory- Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Virtual Memory- Demand Paging, Copy-on-Write, Page Replacement, Thrashing

#### **Unit IV**

**Mass-Storage Structure:** Overview of Mass-Storage Structure, File-System Interface-File Concept, Access Methods, File Sharing, Protection, File-System Implementation-File-System Structure, NFS, I/O Systems- I/O Hardware

#### **Unit V**

**Protection and Security:** Goals of Protection, Principle of Protection Domain of Protection, Security Problem, Program Threats, Cryptography as a Security Tool, Virtual Machines

#### **References**

- Abraham Silberschatz, Operating System Concepts, John Wiley & Sons, Eighth Edition, 2014.
- Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, John Wiley & Sons, Eighth Edition, 2013.
- Andrew S Tanenbaum, Modern Operating Systems, Pearson, 2015.

## 2. SDE SKS PGD 2 Data Structures and Algorithm Analysis

### Unit I

**Implementing generic components:** Pre-Java, Simple generic classes and interfaces, Running-Time Calculations, General rules, Solutions for the maximum subsequence sum problem, List (Abstract Data Type) ADT, Lists in the Java Collections API, Implementation of linked list, Stack ADT, Queue ADT.

### Unit II

**Implementation of Trees:** Tree traversals with an Application, Binary trees, Search tree ADT—Binary search trees, AVL trees, B-Trees, Hash function, Separate chaining, Hash Tables without linked lists, Rehashing, Heaps - Binary Heap, d-Heaps, Skew Heaps, Binomial Queues.

### Unit III

Insertion sort, Heap sort, Merge sort, Quicksort, Linear-time sorts: Bucket Sort and Radix Sort, Equivalence Relations, Dynamic equivalence problem, Basic data structure, Smart union algorithms, Path compression.

### Unit IV

**Algorithms:** Topological sort, Shortest-path algorithms, Network flow problems, Minimum spanning tree, Greedy algorithms, Divide and conquer, Dynamic programming, Randomized algorithms, Backtracking algorithms.

### Unit V

**Amortized Analysis -** Fibonacci Heaps, Advanced Data Structures and Implementation- Top-Down Splay Trees, Red-Black Trees, Suffix arrays and Suffix trees, Pairing heaps.

### References

- Mark Allen Weiss, Data Structures and Algorithm Analysis in Java, Pearson Education, Third Edition, 2012.
- Debasis Samanta, Classic Data Structures, PHI Learning, 2014.
- Nitin Upadhyay, The Design and Analysis of Algorithms, Katson, 2013.

### **3. SDE SKS PGD 3 Data Base Management Systems**

#### **Unit I**

Database, Advantages of using DBMS approach, Data models, Schemas, Instances, Three-schema architecture and data independence, Database languages and interfaces, Relational model concepts, Relational model constraints and relational database schemas, SQL data definition and data types, Specifying constraints in SQL, Basic retrieval queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL.

#### **Unit II**

Complex SQL Retrieval Queries, Specifying Constraints as Assertions and Actions as Triggers, Views (Virtual Tables) in SQL, Schema Change Statements in SQL, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Entity Types, Entity Sets, Attributes, and Keys, Weak Entity Types.

#### **Unit III**

Enhanced Entity, Relationship Model, Subclasses, Superclasses and Inheritance, Specialization and Generalization, Overview of object database concepts, Object definition language, Object database conceptual design, Simple OQL queries, Database entry points, and iterator variables, XML hierarchical (Tree) data model, Database programming: techniques and issues, Embedded SQL, dynamic SQL, and SQLJ.

#### **Unit IV**

Functional dependencies, Normal forms based on primary keys, General definitions of second and third normal forms, Boyce-Codd normal form, Introduction to transaction processing, Desirable properties of transactions, Two-phase locking techniques for concurrency control, Concurrency control based on timestamp ordering, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple granularity locking, Using locks for concurrency control in indexes.

#### **Unit V**

Multivalued dependency and fourth normal form, Join Dependencies and fifth normal form, Active database concepts and triggers, Temporal database concepts, Spatial database concepts, Multimedia database concepts, Information retrieval (IR) concepts, Overview of data mining technology, Characteristics of data warehouses.

#### **References**

- RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, Sixth Edition, 2011.
- SilberschatzA ,Database Systems Concepts, McGraw Hill, Sixth Edition, 2011.

#### 4. SDE SKS PGD 4 Internet Programming

##### Unit I

**HTML:** General introduction to internet and WWW; Text tags; Graphics, video and sound tags; Link and anchor tags; Table tags; Frame tags; Miscellaneous tags (layers, image maps etc.); CSS; DHTML; Example applications; Simple introduction to XML and VRML .

##### Unit II

**CGI Programming:** HTML forms and fields; Perl: Basic control structures, Data types and basic features; CGI programs: GET & POST methods, Simple applications; Cookies; Server side includes; Example applications.

##### Unit III

**Creating web pages:** Javascript- Basic data types; Control structures; Standard functions; Arrays and objects, Event driven programming in Javascript, **Handling html form with PHP, AJAX, JQUERY,** JDBC, .NET Technology, JSP.

##### Unit IV

**Introduction to Python:** Data and expressions- Values and types: int, float, boolean, String, and list; Variables, Expressions, Statements, Tuple assignment,Control flow and functions, Example and applications.

##### Unit V

Programming Elements of Python: **Lists, Tuples, Dictionaries;** Files, Modules, Packages; Handling exceptions, Example and applications.

##### References

- Joel Sklar, Principles of Web Design, Vikas Publications, 2014.
- V.K. Jain, Advanced Programming in Web Design, Cyber Tech Publications,2008
- H M Deitel, P J Deitel& A B Goldberg, Internet and Worldwide web programming: How to Program, 3/e, Pearson Education, 2007

- Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2012
- John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press , 2013

## **5. SDE SKS PGD 5 Object Oriented Programming through Java**

### **Unit I**

Brief history of Java, Special features of Java, C++ Vs JAVA, JAVA and internet and WWW, JAVA support systems, JAVA environment. JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & variables, Data types, Declaration of variables, Scope of variables, Symbolic constants, Type casting. Operators: Arithmetic, Relational, Logical Assignments, Increment and decrement, Conditional, Bitwise, Special, Expressions & its evaluation. If statement, if...else... statement, Nesting of if...else... statements, else...if Ladder, Switch, ? Operators, Loops –While, Do, For, Jumps in Loops, Labelled Loops.

### **Unit II**

Defining a class, Adding variables and methods, Creating objects, Accessing class members, Constructors, Methods overloading, Static members, Nesting of methods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final classes, Finalize methods, Abstract methods and classes, Visibility control.

### **Unit III**

Arrays: One dimensional & two dimensional, Strings, Vectors, Wrapper classes, Defining interface, Extending interface, Implementing interface, Accessing interface variable, System packages, Using system package, Adding a class to a package, Hiding classes.

### **Unit IV**

Creating threads, Extending the threads class, Stopping and blocking a thread, Life cycle of a thread, Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing the runnable interface.

### **Unit V**

Local and remote applets Vs applications, Writing applets, Applets Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding applet to HTML File, Running the applet, Passing Parameters to applets, Aligning the display, HTML tags & applets, Getting input from the user, JDBC.

### **References**

- E.balaguruswamy,”Programing with java - a primer” Mcgraw Hill Education, 2014
- Herbert Schildt, Java: The Complete Reference, Seventh Edition,2007

- Peter Norton, “Peter Norton Guide To Java Programming”, Techmedia Publications, 1997.
- Walter Savitch, “Java: An Introduction to Problem Solving and Programming”, Pearson Education, 7th Edition, 2015.
- Bruce Eckel , “Thinking in Java”, Pearson Education, 4th Edition, 2006.

## 6. SDE SKS PGD 6 Software Engineering and Project Management

### Unit I

**Introduction :** Software engineering, Software development projects,, Need for software process, Characteristics of a software process, Software life cycle model: Basic concepts, Waterfall model and its extension, Rapid application development, Spiral model, Project estimation techniques, COCOMO model, Risk management- Risk assessment, Requirements analysis and specification: Requirement gathering and analysis, Users of SRS document, Time spending and Resource to develop an SRS Document, Characteristics of Good SRS Document, Attributes of Bad SRS Document, import categories of Customer Requirements, Functional requirements.

### Unit II

**Software Design:** Overview of the Design Process, Characterise a good software design, Cohesion and coupling, Layered arrangement of modules, Approaches to software design, Function oriented design: Overview of SA/SD methodology, Structured analysis, Developing the DFD Model of a system, Structured design, Problem partitioning, Abstraction, Modularity.

### Unit III

**Object-oriented design:** Object-oriented design concepts, UML, UML Diagrams, Use Case Model, Class Diagrams, Interaction Diagrams, Activity Diagram, Patterns- Basic Pattern concepts, An Object-oriented analysis and design methodology, OOD goodness criteria.

### Unit IV

**Coding and Testing:** Coding, Code review, Software documentation, Testing, Unit testing, Black-box testing, White -box testing, Debugging, Program analysis tools, Integration testing, System testing, Software reliability and quality management: Software reliability, Statistical testing, Software quality, Software quality management system, ISO 9000.

### Unit V

**Computer aided software engineering (CASE):** Characteristics of software maintenance, Software maintenance process models, Basic issues in reuse program, Reuse approach, Client-Server software, Client-Server architectures, CORBA, COM/DCOM, Service-Oriented architecture (SOA), Software as a service (SaaS).

### References

- Rajib Mall, Fundamentals of Software Engineering, PHI Learning Private Limited, Fourth Edition, 2014.
- Pressman, R.S., Software Engineering: A Practitioner's Approach, MGHISE, 7th Edition, 2010.
- Kelkar, S.A., Software Engineering: A Concise Study, PHI, 2007.