B.Sc. Physics and Computer Application (2021 onwards)

SCHEME

Sem	Course Code	Course	No. of hrs/week	No. of credits	Hrs. /sem.	CE	ESE
1	PC1171	Computer Fundamentals and Organization	3	3	54	20%	80%
2	PC1221	Programming in C	3	2	54	20%	80%
2	PC1271	C Programming Lab	S1 – 2 S2 – 2	3	S1 – 36 S2 – 36	20%	80%
3	PC1371	Microprocessors	3	3	54	20%	80%
3	PC1372	Data Structures	3	3	54	20%	80%
4	PC1471	Software Engineering	3	3	54	20%	80%
4	PC1472	Python Programming	2	2	36	20%	80%
4	PC1473	Python Programming Lab	S3 – 2 S4 – 2	4	S1 – 36 S2 – 36	20%	80%
5	PC1571	Data Base Management System	3	3	54	20%	80%
5	PC1581.A PC1581.B PC1581.C	Open Course A. Digital Marketing B. Internet and WWW C. Impact of Social Media Networks	3	2	54	20%	80%
5	PC1572	PHP and MySQL Lab	7	4	136	20%	80%
6	PC1671	Computer Networks and Security	4	4	72	20%	80%
6	PC1672	Operating System	3	3	54	20%	80%
6	PC1673	Major Project	5	4	90	20%	80%

Division of Marks (Lab Examination)

1. First program should be sufficiently simple (From Part A)   **– 25 marks**
   (Logic – 10 marks, Successful compilation – 10 marks, Result – 5 marks)
2. Second Program should be based on advanced concepts (From Part B)   **– 30 marks**
   (Logic – 15 marks, Successful compilation – 10 marks, result – 5 marks)
3. Viva Voce   **– 15 marks**
4. Lab Record   **– 10 marks**

                               Total Marks   – 80 marks

PC1171: COMPUTER FUNDAMENTALS AND ORGANIZATION

1. **COURSE OUTCOMES**

    At the end of the course, the student will be able to:

CO1: Remember the basic concepts of computers.
CO2: Understand the functional knowledge about PC hardware, operations and concepts.
CO3: Understand the functional units of a standard PC and it's working.
CO4: Understand the memory organization in a computer.

2. **SYLLABUS**

    Module I: Characteristics of Computer; Von Neumann model; Inside a Computer: SMPS, Motherboard, BIOS, CMOS, Ports and Interfaces, Expansion Cards, Ribbon Cables, ASCII; Types of Input Devices, Types of Output Devices.

    Module II: Memory Representation, Hierarchy, Memory Units: RAM (SRAM, DRAM); ROM; Secondary Storage Devices: Magnetic Tape, Magnetic Disk, Types of Magnetic Disks, Optical Dish, Types of Optical Disks; USB: Pen drive, External Hard Disk; Memory Stick; CPU Registers, Cache Memory, Operations in Cache memory, hit ratio; Virtual Memory.

    Module III: Instruction Format; Instruction Cycle: Fetch Cycle, Execution Cycle; Instruction Set: CISC Architecture, RISC Architecture, Comparison; Memory Chips; Pipelining and Parallel Processing; Microprogrammed Control and Hardwired Control.

    Module IV: Input/Output Organization: Asynchronous Data Transfer, Programmed I/O (concepts only); Interrupts: Types of interrupts, processing interrupts, interrupt hardware and priority, DMA: DMA Controller, DMA Transfer Modes; I/O Processor.

3. **REFERENCES**

    3.1 Core

    - Introduction to Information Technology, 2nd Edition, ITL Education Solutions Limited, Pearson

    - John D. Carpinelli, Computer systems Organization & Architecture, Pearson Education

    3.2 Additional

    - E. Balaguruswamy, Fundamentals of Computers, McGraw Hill, 2014

    - Carl Hamacher, Vranesic Zaky, Computer Oranization 4th Edition, McGraw Hill

    3.3 Assignments and Activities

    Applications of Computers in various fields, - Pioneers in IT, - IT Policy, IT and Development, - IT in India (major initiatives, key institutions, statistics), IT in Kerala (major

initiatives, key institutions, statistics), - Careers in IT, - Computer faults: hardware ‹f- software, - types of faults, - diagnostic programs and tools, - printer problems, - monitor problems, problem diagnosis, organization of a modern PC.

PC1221: PROGRAMMING IN C

1. COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	**Remember the basics of computer**
CO2	**Understand the structure of program writing**
CO3	**Apply control structures and pointers**
CO4	**Analyze user defined functions**
CO5	**Evaluate dynamic memory allocation**
CO6	**Create string handling functions**

2. SYLLABUS

Module I: Introduction to programming**:** Algorithm & Flow charts: Definitions, Symbols used to draw flowcharts, Program Writing — Structure of the Program, Source code, Object code, Executable file, Variables and Constants, Rules for naming the Variables/Identifiers; Basic data types of C, int, char, float, double; storage capacity — range of all the data types;

Module II: Basic Elements: Operators and Expressions: Expression Evaluation (Precedence of Operators); simple I/O statements, Control structures, if, if else, switch-case, for, while, do-while, break, continue. Arrays: Defining simple arrays, Multi-dimensional arrays, declaration, initialization and processing.

Module III: Functions & Pointers: concept of modular programming, Library, User defined functions, declaration, definition & scope, recursion, Pointers: The & and * Operators, pointer declaration, assignment and arithmetic, visualizing pointers, call by value; call by reference, dynamic memory allocation. Storage classes.

Module IV: Advanced features: Array & pointer relationship, pointer to arrays, array of pointers. Strings: String handling functions; Structures and unions; File handling: text and binary files, file operations, Functions for file handling, Modes of files

3. REFERENCES

3.1 Core

- Asholc N. Kamthene, *Programming in* C, Pearson Education, Second edition

3.2 Additional

- E. Balaguruswamy, *Programming in ANSI* C, McGrawhill, Sixth Edition

3.3 Assignments and Activities

Pre-processor directives- 4include, #define, macros with arguments, the operators# and 4#, conditional compilations, multiple fife programming, - creating header files, program

verification, algorithm efficiency analysis; int86 functions and graphic functions.

PC1271: C PROGRAMMING LAB

Part A

The C laboratory work will consist of 20-25 Experiments

1-15. Testing out and interpreting a variety of simple programs to demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.

Part B

16. 1-D Arrays: A variety of programs to declare, initialise, read, print and process 1-D arrays of various basic data types. Processing to include, selection, sum, counting, selective sum, selective counting, reversing etc.
17. Pointers: A large number of trivial programs involving all possible data types to familiarize the syntax of pointers in a variety of situations and to draw memory diagrams based on the observations.
18. Structures: A variety of programs to declare, initialise, read, print and process structures made up of a variety of data types and structures.
19. 2-D Arrays: A variety of programs to declare, initialise, read, print and process 2-D arrays of various basic data types. Processing to include, selection, sum, counting, selective sum, selective counting, reversing etc.
20. Array of Structures and Structure of Arrays: Programs to demonstrate declaration and processing of structure of arrays and array of structures.
21. Pointers to Arrays: A number of programs to demonstrate handling of 1-D and 2-D arrays using pointers and to draw memory diagrams based on the observations.
22. Pointers to Structures: A number of programs to demonstrate use of pointers to structures and to draw memory diagrams based on the observations.
23. Functions –I: Simple Examples of declaring and using functions of the following categories (i)no argument, no return, (ii) argument, no return, (iii) no argument, return, (iv) argument, return, all pass by value
24. -Functions –II: Declaring and using functions with pass by reference, Passing and Returning structures, Recursive functions.
25. Files: Simple Example involving use of multiple files: declaring, opening, closing, reading from and writing to text files.

PC1371: MICROPROCESSORS

1. **COURSE OUTCOMES**

   At the end of the course, the student will be able to:

CO1: Remember the basic concepts of computers.
CO2: Understand the functional units of a standard PC and its working.
CO3: Understand the architectural features of 8086 processor.
CO4: Create assembly language programs for 8086 processor.
CO5:   Apply the tools debug, TASM/ MASM.

2. **SYLLABUS**

   Module 1: Microprocessor Literature, Evolution of microprocessor, Basic functional blocks of a microprocessor, Microprocessor based systems, Concept of multiplexing; Intel 8086 Pins, Signals and architecture: Introduction, pins and signals, architecture, instruction and data flow,

even and odd memory banks, bus cycles and timing diagram

Module 2: Instruction set of 8086**:** Instruction format, addressing modes, execution time, affecting flags, Data transfer, arithmetic, logical, string manipulation, control transfer and processor control instructions; Interrupts: Its need, classification, sources, interrupts of 8086, Implementing interrupt scheme, INTR and its expansion, Programmable Interrupt Controller,

Module 3: Assembly language programming: Program development tools, variables and constants used in assemblers, assembler directives, Procedure and macros, Interrupts of personal computers, Hand coding of assembly language programs, examples

Module 4: 80X86 family of processors: Introduction, 80186, 80286, 80386, 80486, Pentium, Advanced Pentium processors

3. **REFERENCES**

3.1 Core

- A Nagoor Kani, 8086 Microprocessor and its applications, McGrawhill, Second edition

3.2 Additional

- N. Madhivanan, Microprocessors, PC Hardware and Interfacing, PHI Edition

- R S Gaonkar, Microprocessor Architecture, Programming and Applications with 8086, Wiley Eastern Edition

3.3 Assignments and Activities

Miscellaneous Topics: Features of core2, dual core and I series processors, RISC, CISC, Motherboard of IBM PC, Drives, Peripherals, I/O buses, Parallel, Serial and USB ports.

PC1372: DATA STRUCTURES

1. **COURSE OUTCOMES:** At the end of the Course, the student will be able to

CO1	Remember purpose of Data Structures
CO2	Understand different Data Structures
CO3	Apply programming languages
CO4	Analyze working of different data structures
CO5	Evaluate expressions
CO6	Create different Data Structures

2. **SYLLABUS**
Module I: **Introduction:** Concept of Data Structures, Types of Data Structures, Linear versus Non-Linear Data Structures, Data Structure Operations. **Array:** Linear Array-Memory representation,

insertion and deletion operation, Multidimensional Arrays-memory representation, Sparse Matrices. **Linked List:** Concept of Linked List, Memory representation, Single Linked List - Traversing, Searching, Insertion, Deletion, Circular Header Linked List, Doubly Linked List - Insertion, Deletion, Difference of Linked List and Array.

Module II: Stack: Representation and operations on Stack using arrays and linked list, application of Stack - Polish Notation- Conversions to Infix, postfix and prefix notations, Infix to postfix conversion using stack, Evaluation of postfix expression using stack **Queue:** Implementation and operations on Queue using arrays and linked list, Deque- Types Input and output restricted, Priority Queues-Array and Linked list representation

Module III: Trees: Concept of Trees, Tree terminologies, **Binary tree:** Complete and Extended Binary tree, Expression trees, Representation of Binary Tree, Traversing Binary Trees – Preorder, Inorder, Postorder. **Binary Search Tree (BST):** Search, Insertion and Deletion operations, creating a Binary Search Tree. **Graph:** Concept of Graph, Graph terminologies, Graph Traversal – BFS, DFS.

Module IV: Sorting: Bubble Sort, Selection Sort, and Insertion Sort. **Searching**: Sequential searching, Binary searching. Hashing- hash table, types of hash functions, Collision Resolution Techniques-linear probing, quadratic probing, double hashing, chaining.

3. **REFERENCES**
   3.1 Core
   - Seymour Lipschutz, Data Structures, Schaum's outline Series. The McGraw Hill
   - S. K Srivastava, Deepali Srivastava. Data Structures Through C in Depth. BPB Publications.

     Second Revised & Updated Edition.

   3.2 Additional

   - K Sharma. Data Structures using C. Pearson, Second Edition.

   - Ashok N. Kamthane, Introduction to Data Structures in C, Pearson

   3.3 Assignment and Activities
   Recursion, B Tree, Huffman Tree.

PC1471: SOFTWARE ENGINEERING

1. **COURSE OUTCOMES**
   At the end of the course, the students should be able to:

CO1	Understand the importance of having a process for software development.
CO2	Familiarize with various software testing techniques and tools.
CO3	Apply various models in the software development projects.
CO4	Analyze the process of software development

2. **SYLLABUS**

   Module I: Introduction: Evolution, Software Development Projects-Program versus product, Types of Software Development Projects Software life cycle models: A few basic concepts, Waterfall model

and its extensions, Rapid Application Development (RAD), Agile development models, Spiral model, Comparison of different life cycle models

Module II: Software Project Management, Project Planning, Metrics for project size estimations,

Project Estimation Techniques, Basic COCOMO model, Scheduling-Work break down structure, Activity Network, Basic concepts of CPM, PERT and Gantt Chart. Software Requirements Analysis and Specification: Requirements gathering and analysis, Software Requirements Specification.

Module III: Software Design: overview of the design process, How to characterize a good software design, Cohesion and Coupling, Approaches to software design, Function oriented design: Overview of SA/SD Methodology, Structured analysis, Developing the DFD model of a system, Structured Design, Object modelling Using UML, Unified Modelling Language (UML), UML diagrams-Class, Interaction, Activity and State chart diagram.

Module IV: Coding and Testing: Coding, Code review, Testing, Unit testing, Black box testing, white box testing: Basic concepts, Debugging, Integration testing, system testing, Software Reliability and quality management: Software reliability, Software maintenance: Characteristics of software maintenance, Software reverse engineering, Emerging Trends: Client Server Software, Client Server architectures, CORBA, Service Oriented Architectures (SOA), Software as a Service.

3. **REFERENCES**
   3.1 **Core**
   - Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, PHI
   3.2 **Additional**
   - Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House
   - Software Engineering - A practitioner's approach (Sixth Edition), Roger S Pressman-McGraw Hill Companies, Inc
   3.3 **Assignments and Activities**
   Preparing various documents, ase studies, preparing test plans, UML diagrams, Metrics for various development phases, Agile Programming Methodologies, extreme Programming, Formal Methods, CASE Tools

PC1472: PYTHON PROGRAMMING

1. **COURSE OUTCOMES**: At the end of the course, the student will be able to

CO1	Remember the concepts of python programming
CO2	Understand data types and differences
CO3	Apply CGI programming
CO4	Analyze the concepts of database programming in python
CO5	Evaluate the usage of Python package installer PIP
CO6	Create programs using libraries such as Flask, SQLAlchemy, Pandas, numpy etc..

2. **SYLLABUS**

Module I: Introduction to Python - Features of Python, Identifiers, Reserved Keywords, Variables, Comments in Python, Input, Output and Import Functions, Operators; Data Types and Operations -

int, float, complex, Strings, List, Tuple, Set, Dictionary, Mutable and Immutable Objects, Data Type Conversion; Flow control - Decision Making, Loops-for, range () while, break, continue, pass;

Module II: Functions- Definition, calling, arguments, anonymous function, recursion, return; Modules & Packages - Built-in Modules, Creating Modules, import statement, Locating, modules, Namespaces and Scope, dir (), reload (), Packages in Python; File Handling- open, close, write, read, methods, rename, delete, directories;

Module III: Object oriented programming- class, object, method, attribute, destructor, encapsulation, data hiding; Exception handling- built in exceptions, Handling, Exception with arguments, Raising and User defined exceptions, Assertions in Python; Regular expressions – match, search, replace, patterns.

Module IV: Database Programming- Connection, Create, insert, update, delete, commit, rollback, disconnection, exceptions; Iterators- Data type supports iterators; CGI Programming- HTTP Header, Env variables, Forms, Radio button, Dropdown box, check box, text area, cookies, uploading file.

3. **REFERENCES**
   3.1 Core
   - Jeeva Jose, "Taming PYTHON By Programming", Khanna Publications, 2017
   3.2 Additional

   - Allen B. Downey," Think Python- How to think like a computer scientist", Second Edition, O'Reilly,2016.
   - Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC,2013.

PC1473: PYTHON PROGRAMMING LAB

The laboratory work will consist of 10-15 Experiments

Part A

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops. (square root, gcd, exponentiation, sum of an array of numbers, linear search, binary search, bubble sort, insertion sort, selection

  sort etc.)
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.

Part B

● Read and write data from/to files in Python.

● Programs to demonstrate creating and handling of modules and packages

● Programs involving a variety of Exception Handling situations

● Programs involving Database manipulation

● CGI programming

PC1571: DATABASE MANAGEMENT SYSTEMS

1. COURSE OUTCOMES

At the end of the Course, the student will be able to:

CO1	Understand the concept of database.
CO2	Develop skills to design an ER diagram.
CO3	Create database using SQL and perform operations in SQL.
CO4	Familiarize the management of concurrent transactions.
CO5	Apply the design concepts and normalization in database easily.

2. SYLLABUS

Module 1: Introduction: Database system applications, Purpose of database systems, View of data, Database languages, Database design, Database and application architecture. Data models: Hierarchical model, Network model, Entity Relationship model, Object oriented data model, Relational model. **Introduction to relational model:** Structure of relational database, Database schema, Keys, Relational algebra and calculus.

Module 2: Database design using ER model: Overview of the design process, Entity relational model, Complex attribute, Mapping cardinalities, Primary key, removing redundant attributes in entity sets, Reducing ER diagram to relational schema, Entity relationship design issues. Relational database design: Features of good relational design, Decomposition using Functional Dependencies, Normal forms (1NF, 2NF,3NF,BCNF,4NF)

Module 3: Introduction to SQL: Overview of the SQL query language, SQL data definition, Basic structure of SQL queries, Additional basic operations, Set operations, Null values, Aggregate functions, Nested subqueries, Modification of the database, Intermediate SQL: Join expressions, Views, Integrity constraints, Authorization.

Module 4: Transactions: Transaction concept, A simple transaction model, ACID property, Serializability, Concurrency control: Lock based protocol, Deadlock handling, Multiple granularity, insert operations, delete operations and predicate Reads, Timestamp based protocols, Validation based protocols. Basic security issues: The need for security, Physical and Logical security, Design issues, Maintenance issues, Operating system issues and availability, Accountability.

3. REFERENCES

3.1 Core

- Avi Silberschatz, Hentry F. Korth, S. Sudarshan, Database System Concepts, Seventh Edition.

3.2 Additional

- Ramon A. Mata-Toledo and Pauline K. Cushman, Database Management Systems, MC Graw Hill Education.

- Atul Kahate, Introduction to Database Management Systems.

OPEN COURSES

PC1581.A DIGITAL MARKETING

1. COURSE OUTCOMES
At the end of the Course, the student will be able to:

CO1	Remember Digital marketing function in organizations
CO2	Understand different modes of payments
CO3	Analyze security and legal issues in digital marketing
CO4	Understand social media marketing

2. SYLLABUS
Module I: Introduction: Nature, Scope and Importance of Digital Marketing; Evolution of Digital Marketing; Core Concepts-Inbound Marketing, Content Marketing, Email Marketing, Influential Marketing; Holistic Digital Marketing Concept, 10Ps of digital marketing; Digital Marketing Environment: Macro and Micro Environment.
Module II: E-banking: approaches, devices, services, benefits, drawbacks, Electronic payment systems-credit cards, debit cards, smart cards, credit accounts, cyber security, encryption, secret key cryptography, public key cryptography, digital signatures, firewalls
Module III: Digital Marketing: Search Engine Optimization (SEO), Social Media, Content Marketing; Email Marketing, Mobile Marketing. Challenges for Digital Marketing: Increased Security Risk, Cluttered Market, Less Focus on Keywords, More Ad Blockers, Increased Ad Costs.
Module IV: Digital Marketing: Pay per Click-Search Engine Advertising, Advantages, Factors, Conversion Rate Optimization (CRO); Digital Marketing- Web Analytic. Social Media Marketing: Face book, Pinterest, Twitter, LinkedIn, YouTube, Google Adwords, Google Analytics; Issues and Future enhancement of Digital Marketing.

3. REFERENCES
3.1 Core
- Ian Dodson-*The art of Digital Marketing*, Wiley

3.2 Additional
- Puneet Singh Bhatia- *Fundamentals of Digital Marketing*, Pearson Education

3.3 Assignments and activities

Collection of current marketing tools, case studies, new trends.

PC1581.B INTERNET AND WWW

1. COURSE OUTCOME

At the end of the Course, the student will be able to:

CO1	To **understand** the basic concepts of Networks.
CO2	To **learn** the working of Internet.

CO3	To **analyse** different search engines and its working
CO4	To **familiarise** Network Protocols and WWW.

2. SYLLABUS

Module I: Introduction to Network-Types of Network-Network Topologies, Basic communication technology, Intranet, Extranet-Advantages, Internet-History, Modes of Connecting to Internet-Dialup Access-Direct to dedicated connections, Internet Service Providers, Domain Name Service, Internet Addresses-Addressing Scheme-IPV6, Modems, Routers, Network cards Communication Software, Internet Tool-File Transfer Protocols, Search Tools, Telnet.

Module II: Introduction to WWW-WWW and HTTP, Webpage, Introduction to Web Browser-Book Marks-Comparison, Directories, Search Engines-Working and features-Search Strategies – Search Generalization-Search Specialization-Working.

Module III: Uniform Resource Locator (URL), OSI reference model, Introduction to TCP/IP-TCP/IP Model, Email-Working with Email-Sending Mail-Reading Mail-Replying to Mail-Deleting Mail-Advantages and Disadvantages of Email, Basics of Chat Rooms, SMTP.

Module IV: Introduction to Web Server-Personal Web Server (PWS)-Internet Information Server (IIS)-Apache Webserver-Benefits of Web Server, Introduction to Security-Internet Security-Identifying Network Stations, Network Protocols-Internet Security Threats.

3. REFERENCES

3.1 Core

- Dr.SurenderJangra, "Basics of Internet and Web", Vayu Education of India. New Delhi

  110002

3.2 Additional

- Raymond Greenlaw, Ellen Hepp"Fundamentals of Internet and the World Wide Web,

  McGraw-Hill.

PC1581.C IMPACT OF SOCIAL MEDIA NETWORKS

COURSE OUTCOME

At the end of the Course, the student will be able to:

CO1	To understand the types of social media networks and its uses.
CO2	To learn the impact of social media on society & commerce
CO3	To analyse the impact of social media on work, training & development and on relationships
CO4	To familiarize challenges of social media in terms of privacy, security & health

2. SYLLABUS

Module I: Introduction to Social Media networks: Types of Social Media- Uses of Social Media Networks-Popular Social Media Websites-Mobile social media- Types of Users- Growth of social media networks

Impact of Social Media on Society: Sharing of Information and its Need – Entertainment – Communication Tool -Influence-Social media activism-societal issues- social cause- Impacts on Politics-Pros and Cons-Positive and negative effects of Social media on Society.

Module II: Impact of Social Media on Commerce: Social media Marketing-Promotion of Business-Digital Marketing & SMM -Advantages to Business-Knowledge sharing and Collaborative Work Management-Customer Benefits-Impacts-pros and cons.

Impact of Social Media on the World of Work: Job Recruitment and Hiring-Benefits- Researching Job Candidates-Impact of professional social media networks.

Module III: Impact of Social Media on the Training & Development: Social media in Learning-Online-Long Distance Learning-Impact of Blogs, Wikis, LinkedIn, Twitter, Facebook and Podcast- Privacy and Frauds.

Impact of Social Media on relationship: Bonding and Friendships –Pros and Cons- Issues Arising-Impact of Social Media on Kids, Teens & Youth.

Module IV: Challenges of Social Media- Criticism on Social Media-Cyberbullying-Lack of Privacy-Security Issues. Addictions to Social media – Games- Impact on Education: Positive and negative effects– Impact on Physical and Mental Health-Emotional Insecurities- Depression-Anxiety-Behavioural Issues-Wastage of Time etc. Future of Social Media Networks.

3. REFERENCES

3.1 Core

- Hana S.Noor Al-Deen,John Allen Hendricks, "Social Media-Usage & Impact", Rowman&Littlefield Publishing Group

3.2 Additional

- Dedria Bryfonski,"The Global Impact of Social Media"-Greenhaven Press
- Dr.Sanjay Singh Baghel,Dr Uma s singh,'Social Media and Indian Youth" Apple Books Publishers

PC1572: PHP and MySQL LAB

The laboratory work will consist of l5 -20

Part A (PHP)

- Setup of WAMP/XAMPP server or Setup Apache MySQL and PHP

- Write a PHP program to generate a random number between 1 and 100.
- Modify above program to accept range of the random number from HTML interface.
- Programs involving various control structures like if, else, elseif/else if, Alternative Syntax for 'if, else, elseif/else if
- Programs involving various control structures lilac while, do-while, for, foreach, switch, break, continue. Try alternative syntax for while, do-while, for, foreach, and switch.
- Programs involving the declaration, return, require, include, require- once, include once and goto.
- Programs to demonstrate PHP Array functions, PHP Array Sorting, PHP Key Sorting, PHP Value Sorting, PHP Multi Array Sorting, PHP Array Random Sorting,
- Programs to demonstrate PHP Array functions. PHP Array Reverse Sorting, Array to String Conversion, String to Array, Array Count, Remove Duplicate Values
- Programs to demonstrate PHP Array functions. array Search, Array Replace, Array Replace

Recursive, Array Sub String Search
- Demonstrate the use of regular expression to compare two strings.
- Extract Domain name from URL
- Find the number of rows from a MYSQL database for your query.
- Generate a Guestbook which will allow your website visitor to enter some simple data about your website.
- Develop a PHP program for Email Registration.
- Develop a project for making Application form and performing Degree Admission On-line.

Part B (MySQL)

- Create Database, create table, insert, update, delete and select queries

- Program to connect PHP and MySQL

PC1671: COMPUTER NETWORKS AND SECURITY

1. **COURSE OUTCOMES**
   At the end of the Course, the student will be able to

CO1	Remember various network technologies, design issues and characteristics
CO2	Understand the purpose of computer networks and the basic issues in information security
CO3	Apply the use of layer architecture for networking systems, information security measures
CO4	Analyze the concept of different models of network and the working of various ciphers
CO5	Evaluate data link controls and Information Security policies
CO6	Create awareness on different networking protocols and information security policies

2. **SYLLABUS**

Module I: Network Introduction: - Use of computer networks-applications, network topologies, Network hardware-LAN, WAN, MAN, VPN, PAN, broadcast, point-to-point, Network software-connection-oriented, connectionless, protocol hierarchies, Reference model- OSI, TCP/IP-. Internet, mobile phone network, wireless LAN, RFID and sensor networks. Guided transmission media, Wireless transmission, Satellite, Data communication: -Data flow, data transmission mode-simplex, half duplex, full duplex. Bandwidth- bit rate, baud rate, multiplexing-FDM, TDM, WDM. Switching - circuit, packet, message. Mobile system -1G, 2G, 3G, GSM

Module II: Data link and Access controls: Framing, error control, flow control- feedback-based, rate-based, Error detection and correction- hamming code, parity, checksum, CRC, Stop and wait protocol, sliding window protocol, ALOHA, pure, slotted, CSMA, CSMA/CD. LAN transmission equipment- Network Interface card (NIC), repeaters, hubs, bridges, routers, switches, gateways, Internetworking-Datagram, routing algorithm- adaptive, non-adaptive, static, dynamic, distance vector, link state, Dijikstra algorithm (shortest path), Internet protocol (IP)- services, IP address, TCP, UDP. Network applications- client-server model, DNS, Remote login, FTP, email-SMTP, MIME

Module III: Information Security: Computer Security- objectives, security attacks, services, network security model, network security terminologies, Cryptography: Symmetric cipher model, cryptanalysis and Brute force attack, Classical Encryption Techniques, substitution, transposition techniques, Steganography, Feistel

cipher, Data Encryption Standard (DES)-strength , Public-key cryptosystem- RSA algorithm-working Authentication: cryptographic hash function, message digest, message authentication code, authentication methods, Digital signature:- model, Digital Signature Standard(DSS)-approach, Digital Signature Algorithm (DSA)-working.

Module IV: Web Security: threats, Secure Socket Layer (SSL)- architecture- session and connection, E-Mail security: - PGP, MIME, S/MIME, IP Security: - benefits, IPsec services-transport and tunnel mode, IPv4 and IPv6- comparison. System Security: malicious software-Virus-types, worms, Trojans, Spyware, Firewall-types, characteristics and benefits. Security and Law: -   Regulations in India- IT Act 2000/2008, Cyber Crime- cyber law, Indian Copyright Act, Indian Contract Act, Consumer Protection Act, Future Trends –The Law of Convergence.

3.   REFERENCES

3.1 Core
- Andrew S. Tanenbaum, *"Computer Networks"*, Fourth/Fifth edition, Pearson
- Brijendra Singh, *"Data Communication and Computer Networks"*, Fourth edition, PHI
- William Stallings, *"Cryptography and Network Security: Principles and Practice"*, Fifth edition Pearson

3.2 Additional
- Behrouz A Forouzan, *"Data Communication and Computer networks"*, Fourth edition, McGraw Hill
- Achyut S Godbole, *"Data communications and networks"*, Second edition McGrawHill
- V K Pachghare, *"Cryptography and Information Security"*, Third edition, PHI
- Atul Kahate, *"Cryptography and Network Security"*, Mc Graw Hill
- Mohammad Amjad, *"Cryptography and Network Security"*, Paperback

3.3 Assignment and Activities
Peer–to-peer networking, Measurement and packet analysis, blue tooth, emerging topics, networking in LINUX AES, Blowfish algorithms, Kerberos, Comparison of PGP and/ SMIME., Trusted systems.

PC1672: OPERATING SYSTEMS

1.   COURSE OUTCOMES

At the end of the Course, the student will be able to

CO1	Understand working of various Operating Systems
CO2	Apply constrained resource allocation, process scheduling and memory management techniques
CO3	Evaluate synchronization of processes and protection of an Operating System
CO4	Analyse salient features available to various Operating Systems

2.   SYLLABUS

Module I: Operating System Overview: Introduction - Structure of Operating System, the Evolution of Operating System, Operating System Functions, System calls. Distributed Systems: introduction, Trends in Distributed System, challenges.

Module II: Process Management: The Process, Process State, PCB, Threads, Process Scheduling - Basic Concepts, Scheduling Criteria, Scheduling Algorithms. Process Coordination: Critical Section problems, Semaphores, Synchronization - Interprocess Communication Problems. Deadlock – Definition, Resource Allocation Graph, Conditions of deadlock, deadlock prevention, deadlock avoidance, deadlock detection, deadlock recovery.

Module III: Memory Management: Basic Hardware, Address binding, Logical vs. physical address space, Dynamic Loading and Linking, Swapping, Memory Allocation Methods, Paging, Structure of Page Table, Segmentation, Virtual Memory- Background Demand Paging, Page Replacement- Basic Page Replacement, FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement, Thrashing.

Module IV: Storage Management: File Concept, Access Methods, Protection, Implementation- File System Structure, Allocation Methods, Recovery, Secondary Storage- Overview, Disk Scheduling, Disk Management, RAID. I/O Systems- I/O Hardware, Application I/O Interface, Kernel I/O Subsystem.

3. REFERENCES

3.1 Core

- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne-Operating System Concepts, 10th Edition.

3.2 Additional

- P. Balakrishna Prasad- Operating Systems and Systems Programming, 5th Edition.

- Achyut S Godbole and Atul Kahate - Operating systems, McGrawhill

- George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair – Distributed Systems, Concepts and Designs, 5th Edition

3.3 Assignment and activities

Comparison of different Operating Systems using above functionalities- DOS, WINDOWS, UNIX, LINUX, etc.

PC1673: MAJOR PROJECT

1. AIM

- To expose student to industry-standard project practices, through a real-life project work under time and deliverable constraints, applying the knowledge acquired through various courses.

2. OBJECTIVES

- To provide an opportunity to apply the knowledge gained through various courses in solving a real-life problem
- To provide an opportunity to practice different phases of software/system development life cycle
- To introduce the student to a professional environment and/or style typical of a global IT industry
- To provide an opportunity for structured team work and project management
- To provide an opportunity for effective, real-life, technical documentation
- To provide an opportunity to practice time, resource and person management.

3. PROJECT GUIDELINES

- Group Size – Maximum 4, most preferably- 3
- No. of records – No. of group members + 1 (Department copy)

- Certificate should include the names of all members

The minimal phases for the project are: Project feasibility, Investigation of system requirements, Data and Process Modeling, System Design, Program design, Program coding and unit testing, System integration, System implementation and acceptance testing.

3.1 Planning the Project: The Major Project is an involved exercise which has to be planned well in advance. Related reading, training and discussions should start from semester 5 itself.

3.2 Selection of project work: Project work could be of 3 types:

a) Developing solution for a real-life problem: In this case, a requirement for developing a computer-based solution already Exists and the different stages of system development life cycle is to be implemented successfully. Examples are Accounting Software Package for a particular organization, Computerization of administrative functions of an organization, Web Based Commerce, etc. The scope for creativity and exploration in such projects is limited, but if done meticulously, valuable experience in the industrial context can be gained.

(b) Innovative Product development: These are projects where a clear-cut requirement for developing a computer-based solution may not be existing, but a possible utility for the same is conceived by the proposer. An Example is a Malayalam Language Editor with Spell Checker, Computer Music Software for Indian Music, Heat Engines Simulation Software for eLearning, Digital Water Marking Software etc.

(c) Research level project: These are projects which involve research and development and may not be as structured and clear cut as in the above case. Examples are Malayalam Character Recognition, Neural Net Based Speech Recogniser, Biometric Systems, Machine Translation System etc. These projects provide more challenging opportunities to students and can be attempted.

If any student identifies proper support in terms of guidance, technology and references from External organizations and also the supervisors are convinced of the ability of the student(s)to take up the project, it shall be permitted. The methodology and reporting of such projects could be markedly different from type (a) and is left to the proposer/external supervisor of the projects.

3.3 Selection of Team: To meet the stated objectives, it is imperative that Major Project is done through a team effort**.** Though it would be ideal to select the team members at random (drawing lots) and this should be strongly recommended, due to practical considerations, students may also be given the choice of forming themselves into teams preferably **3** in numbers up to a maximum of **4** members (teams less than 3 members may be permitted in certain cases, for valid reasons). A gender mix should also be strongly suggested. A team leader shall be elected through drawing lots. Teams shall maintain team meeting minutes and ensure that every team member has tasks assigned in writing. Team meeting minutes shall form a part of the Project Report. Even if students are doing projects as groups, each one must independently take up different modules of the work and must submit the reports also independently (though, in such cases, some common materials are permissible). Evaluation will also be done independently.

3.4 Selection of Tools: No restrictions shall be placed on the students in the choice of platforms/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

3.5 Selection of Organization & Guide: No restrictions shall be placed on the students in the choice of organization where project work may be done, in terms of locality, type (public/private) etc. It is the duty of the Head of Institute/Principal of College to ensure that the Aim, Objectives and full project guidelines are communicated to the external organization. The guide should ideally be a post-graduate with minimum 2 years of work experience.

Students may also choose to do project in the college/institute (or partially in the college/institute and partially in an external organization), especially product-based work, but in such cases the supervisors must ensure that (i) industry practices are followed (ii) the students undertake a planned visit to an IT industry with international operations to make up for the loss of experience and (iii) the service of an external guide with industry experience is obtained.

3.6 Project Management: Head of Department /Institute should publish a list of students, projects topics, internal guide and external organization (if any) and teams agreed, before the end of semester 5. Changes in this list may be permitted for valid reasons and shall be considered favourably by Head of Department /Institute any time before commencement of the project. Any

request for change after commencement should considered by a committee of 3 teachers and their recommendation shall be accepted by Head of Department/ Institute.

Gantt-chart of proposed activities and a draft statement of project deliverables (which may subsequently be altered if justified) should be prepared before the commencement of the project. The actual completion of each phase should be noted on the chart in the course of the project work. Team meetings should document the progress of the project. Students should submit a fortnightly report of progress which could be indication of percentage of completion marked on the original Gantt-chart, with any notes attached. Students should ideally keep a daily activity log sheet. Changes in the submitted documents are possible, as project development is essentially an evolutionary process. The project guide must ensure that changes are necessary due to the knowledge gained in succeeding phases of the project. The date of Completion of a phase should be brought forward if the changes made are deemed to be errors and not due to additional knowledge gained from a succeeding phase.

3.7 Documentation:

The following are the major guidelines: The final outer dimensions of the report shall be 21 cm X 30 cm. The colour of the flap cover shall be light green. Only hard binding should be done, with title of the Project and the words "< TITLE> BSc (PCA) Project Report 2021" displayed on the spine in 20 point, Bold, Times New Roman. It is highly recommended that Latex be used for documentation.

• The text of the report should be set in 12 pt, Times New Roman, 1.5 Spaced.

• Headings should be set as follows: CHAPTER HEADINGS 20 pt, Times New Roman, Bold, All Caps, Centered.

1. SECTION HEADINGS 12 pt, Times New Roman, Bold, All Caps, Left Adjusted.

1. 1 Section Sub-headings 12 pt, Times New Roman, Bold, Left Adjusted.

Titles of Figures, Tables etc are done in 12 point, times New Roman, Italics, Centered.

PROJECT REPORT

<DEPARTMENT NAME>

<COLLEGE NAME>

<EMBLEM>

<PROJECT TITLE>

Submitted by <STUDENT NAME (REG. NO.)>

Submitted in partial fulfilment of the Requirements for the award of

B.Sc. Physics and Computer Applications degree,

2021 University of Kerala

Some general guidelines on documentation stylistics are:

- Double quotes and single quotes should be used only when essential. Words put in quotes are better highlighted by setting them in italics. E.g.: This process is known as "morphing". This process is known as *morphing.*
- Page numbers shall be set at right hand top corner, paragraph indent shall be set as 3.
- Only single space need be left above a section or sub-section heading and no space may be left after them.
- Certificate should be in the format: "Certified that this report titled...................................is a bonafide record of the project work done by Sri/Kum...............................under our supervision and guidance, towards partial fulfillment of the requirements for the award of the Degree of BSc (Physics and Computer Applications) of the University of Kerala" with dated signatures of Internal Guide, external guide and also Head of Department/Institute.
- If the project is done in an external organization, another certificates on the letterhead of the organization is required: "Certified that his report titled...is a bonafide record
of the project work done by Sri/Kum.......................................under any supervision and guidance, at the ....Department of.................... (Organization) towards partial fulfilment of the requirements for the award of the Degree of BSc (Physics and Computer Applications) of the University of Kerala".
- References shall be IEEE format (see any IEEE magazine or transaction). Take care in use of italics and punctuation. While doing the project, keep note of all books you refer, in the correct format, and include them in alphabetical order in your reference list. E.g.: A book is cited as: Kartalopoulos, S V Understanding Neural Networks and Fuzzy Logic, BPB Publishers, 1996, pp. 21-27. (pp.21-27 indicates that pages 21-27 have been referred. If the whole book is being referred, this may be omitted. If a single page is referred, say 7, it may be cited as p.**7.**
- **Report writing is NOT a hasty activity done after finishing the project**. Students must try to develop the report along with the work, so as to give it flesh and blood. Drafts should be read, modified, spell checked and grammar checked at least thrice during the course of the project and before a final printout is taken, the same may be got approved from the internal guide.
- The students should send two interim reports after the analysis and design phases of the project to internal guides. This will also help the students in their report writing.
- A soft copy of the complete documentation, including source code, should be maintained for any clarification during assessments.

- The Gantt chart, fortnightly progress reports recorded in team meeting minutes mentioned in section 3.5 should appear as appendix to the project report.

Regarding the body of the report, as an indicative example, the following is given (though students should not attempt to fit every kind of project report into this format):

- Organizational overview (of the client organization, where applicable)
- Description of the present system
- Limitations of the present system
- The Proposed system- Its advantages and features
- Context diagram of the proposed system.
- DFD of the proposed system with at least one additional level of Expansion
- Structure Chart/E-R diagrams of the System
- System flowchart
- Files or tables (for DBMS projects) list. Class names to be entered for each file in OO systems.
- List of fields or attributes (for DBMS projects) in each file or table.
- File table that shows the files/tables used by each program and the files are read, written to, updated, queried or reports were produced from them.
- Reports List with column headings and summary information for each report.
- System Coding and variable/file/table naming conventions
- System controls and standards
- Screen layouts for each data entry screen.
- Report formats for each report.

Program documentation is suggested on the following lines:

- Program id
- Program function explanation
- Program level pseudocode or flowchart.
- Data entry screen (reproduced from system documentation).
- Report layout (reproduced from system documentations)
- Decision tables, decision trees, with English Explanation where necessary.
- Program listing
- Test data
- Test results.

3.8 Methodology:

Wherever applicable, object-oriented approach should be used for software development. The project report should generally contain details of the following steps *(though students should not attempt to fit every kind of project into this format):*

(a) Analysis
- Study of existing systems and its drawbacks
- Understanding the functionalities of the system in detail
- Preparation of requirements
- Conduct of Feasibility study
- Development of DFD/use case diagrams

(b) Design
- Design of each subsystems/modules
- Design of each classes
- Design of Algorithms for problem solving
- User interface /Input/ Output Design
- Any other steps if necessary

(c) Coding and Implementation

(d) Testing

(e) Security, Backup and Recovery Mechanisms

(f) On line help and User Manuals

(g) Upgradability Possibilities

3.9 Project IPR & Utilization: The intellectual property rights in all project work done by the students shall vest with the University of Kerala, except in cases where some external organizations seek undertaking from students to concede IPR in all work done in their organization or under their guidance. Where possible, students should attempt to obtain at least a joint IPR for the University. In cases where project works are of public utility, students shall be asked to publish their work including source code and documentation, in so far as their rights are clear.

4. REFERENCES

4. 1 Core

- S A Kelkar, *Software Project Management*, Prentice Hall of India
- W Alan Randolph, Barry Z. Posner, *Effective project planning and management*, PHI

4.2 Additional

- Greg Mandanis, *Software Project Management Kit for Dummies*, IDG Books Joel Henry, *Software Project management*
- Frederic P B, Mythical Man-month, *Essays on Software Engineering*, Addison Wesley David Lamport, *Latex: A document Preparation System*, 2/e, Pearson Edn

5. EVALUATION

5.1 Criteria for external evaluation of Major Project

External evaluation is done by an external examiner appointed by the University

The following components are to be assessed for the End Semester Evaluation of the Major Project:

- Quality of documentation- 30 marks
- Presentation of work- 25 marks
- Viva - 25 marks

Total - 80 marks

5.2 Criteria for internal evaluation of Major Project

Internal evaluation is be done by conducting a viva voce by a team of evaluators comprising of the concerned guides and/or Head of the Department. The following are the components for internal evaluation of the Major Project:

- Presentation of the work-5 marks
- Individual involvement & team work/ Attendance- 5marks
- Timely submission and assessment of 2 interim reports -10 marks

Total - 20 marks