VIKRAM UNIVERSITY, UJJAIN

INSTITUTE OF COMPUTER SCIENCE

PROGRAMME TITLE: PG Diploma in Cloud Computing and Internet of Things (IoT).

PROGRAMME OBJECTIVES:

The objective of the PG Diploma in Cloud computing and IoT programme is to prepare students for productive careers in the software industry and academia by providing an outstanding environment for teaching and government Job. Basic qualification is bachelor's degree in any subjects.

This PG Diploma in Cloud computing and IoT programme has been designed with a 1 Year (Two Semesters) programme approach in mind. In 1 Year diploma, courses are aimed towards skills development in computers using various Cloud Computing and internet of things(IoT) techniques .

The main objectives of the PG Diploma in Cloud computing and IoT programme includes:

- Learn Fundamental of Computers and basics of computer technology.
- To develop in depth understanding of the key concepts of Internet of Things (IoT) to impart knowledge of problem solving techniques, Information Technology and Cloud Computing.
- Develop problem solving skills in interdisciplinary domains.
- Focus on development of technical knowledge and specific skills required in Computer works and Internet Job.
- To develop competent computer professionals with strong ethical values.

PROGRAMME OUTCOMES (POs)

At the end of this programme, Advanced Diploma in Computer Application student will be able to:

- Prepare presentation and report on computer system.
- Identify the components of a computer system and demonstrate basic proficiency in commonly used Cloud Computing and Internet of Things (IoT).
- Understanding the key concepts of IT to improvise organizational performance.

After Completion of the programme students are able to work as-

- Govt. sector
- Private sector
- Computer operator
- Web application developer

First Semester

Paper Code	Title Of Paper	Theory Exam	Minimum Pass Marks (in theory)	Internal Marks	Minimum Pass Marks	Total
1001	Fundamental of Information Technology	70	25	30	11	100
1002	PC-Packages	70	25	30	11	100
1003	Programming and Problem Solving in C	70	25	30	11	100
1004	Digital computer Organization	70	25	30	11	100
1005	Modern Technologies of Computer Science	70	25	30	11	100
		350		150		500

Second Semester

Paper Code	Title Of Paper	Theory Exam	Minimum Pass Marks (in theory)	Internal Marks	Minimum Pass Marks	Total
2001	Cloud Computing	70	25	30	11	100
2002	Internet of Things (IoT)	70	25	30	11	100
2003	Data Communication & Computer Networks	70	25	30	11	100
2004	Network Security	70	25	30	11	100
2005	Information Security	70	25	30	11	100
		350		**150**		**500**

I-SEMESTER

Paper- I: Fundamental of Information Technology

UNIT-1

Computer Fundamental: Characteristics of Computers, History of Computer, Evolution of Computers, Computer Generations and Types of Computer. **Components of a Computer:** Registers, instruction Set, Bus Architecture. **Computer Hardware:** Input Devices, Output Devices. **Storage Devices:** Primary Storage capacity, Memory Types, Memory Measuring Units, Secondary Storage. Software & Software Types.

UNIT-2

Introduction of Programming: Procedure Oriented Programming, Object oriented programming, Concepts used in OOP, Benefits of OOP, Main advantages and disadvantage of OOP, Applications of OOP, OOP vs. POP.

UNIT-3

Operating System Overview: Computer System Startup, Computer System Structure, computer system components, operating System classifications, operating System Services, Major Functions of operating system, Process Management, CPU Scheduling, Scheduling Criteria. **Memory and File Management:** Memory Management Requirements, Swapping, Memory Management Techniques.

UNIT-4

Introduction to DBMS: File System, Traditional File Oriented Approach, DBMS Advantages and Disadvantage, Role of DBMS, Three views of data, DBMS Architecture.

UNIT-5

Introduction to computer Networks: computer Network Definition, Importance of Networking, Types of Networks, Network Topology, Advantages and Disadvantage of computer Networks.

References:

1. Operating Systems Concepts, A. Silbrschaz, P.Galvin, G.Gagne, John Wiley & Sons
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Data base management systems vol. 1., Date C.J.
4. Fundamental of Computer Science & IT, Singh Umesh Kumar, Jain S., Maheshwari A., SSDN publications New Delhi,
5. Data Communications and Networks, Godbole A, Tata Mccraw-Hill Publications.

Paper- II: PC-Packages

UNIT-1

MS windows: Introduction to MS windows; Features of windows; working with windows; My computer & Recycle bin; Desktop, Icons and windows Explorer; Screen description & working styles of windows; Dialog Boxes & Toolbar; working with files & Folders, Simple operations like copy, delete, moving of files and folders from one drive to another; Accessories and. windows settings using control panel-setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & program lists .

UNIT-2

MS word Basics - Introduction to MS office; introduction to MS- word; Features & area of use, working with MS- word; Menus & commands; Toolbars & Buttons; shortcut Menus, wizards & Templates, creating a New Document; Different page views and Layouts; Applying various Text Enhancements; working with - Styles, Text .Attributes; paragraph and Page. Formatting; Text Editing using various features.

UNIT-3

Advanced Features of MS- word- Spell check, Thesaurus, Find & Replace; Headers & Footers: Inserting- Page Number, Pictures, Files, Auto texts, Symbols etc.; working with columns, Creation and working with Tables including conversion to and from text; Margins and Space management in Documents.

UNIT- 4

MS Excel: Introduction and area of use; working with MS Excel: concept of workbook and worksheet; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different views of Worksheet; Column Freezing, Labels, Hiding, Splitting etc.; Using different features of Data and Text; Use of Formulas, Calculation & Functions; Cell formatting including Borders and Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with Various options.

UNIT-5

MS PowerPoint: Introduction and area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its Different Views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts; Columns and Lists; Adding Graphics, Sounds and Movies to a slide; Working with PowerPoint Objects; Designing and Presentation of a Slide Show.

References:

1. Windows XP Complete Reference. BPB publications
2. MS Office XP complete BPB Publication.

Paper- III: Programming and Problem Solving in C

UNIT - 1

Problem identification analysis, design, coding, testing & debugging, implementation, modification & maintenance, algorithms & flowcharts, Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; documentation, naming variables; Top down design; Bottom-up design.

UNIT 2

History of C, Structure of a C program, Data types, Constant & Variable, Operators & expressions, **Control Constructs** - if-else, for, while, do-while, Case statement, Arrays, Type modifiers & Storage classes, Ternary operator, Type conversion & type casting.

UNIT -3

Functions, Arguments, return value, Parameter passing - call by value, call by reference, return statement, Scope, visibility and life time rules for various types of variable, static variable, calling a function, Recursion - basics, comparison with iteration, tail recursion, when to avoid recursion examples.

UNIT 4

Special constructs - break, continue, exit , goto & labels; pointers - &and * operators, pointer expression, pointer arithmetic, String, Pointer to function, Function to parameter, structure - basic, declaration, membership operator, pointer to structure, referential operator, self-referential structures, structure within structure, array in structure, array of structures, Union - basic, declaration: Enumerated data type, Command line arguments.

UNIT 5

File handling and related functions: pdntf & family, c preprocessor- basics, # Include, # define, # undef, conditional compilation directive like #if, #else, #endif, #ifdefand #ifndef, Variable argument list functions.

Reference Books:

l. Keminghan& Richie: The C progamming tanguage, pHI
2. Cooper Mullish: The Spirit ofC, Jaico publishing-Housg Delhi

3. Kanetkar Y: Let us C 4, Kanetkar Y: Pointers in C.

Paper- IV: Digital computer Organization

UNIT-1:

Digital components: Functional units of a computer, logic gates, Minimization of Boolean Expressions, Flip-Flips, Decoders, Encoders, Multiplexers, Counters, and Registers.

UNIT-2:

Data Representation: Number systems, Representations of signed and unsigned numbers, alphanumeric codes, Addition of binary numbers, subtraction, 2's complement, and Floating point number representation.

UNIT-3:

Register Transfer Language & Micro-operations: Concepts of the Bus, Timings in Register transfer, Languages used for data transfer in registers, Data movement from/to memory.

UNIT-4:

Arithmetic circuits, Half adder, full adder, N-bit adder, Logical micro operation, arithmetic logic unit. Instruction sets for basic computer: Addressing modes, Instruction cycles, Control signal generation.

UNIT-5:

Central Processing Unit: General register organization, Memory stacks, Instruction types, Interrupts, Instruction pipelining, Arithmetic pipelining. .

Reference Books:

1. P. N. Basu, Computer Organization and Architecture, Vikas Publication, 2nd Edition.
2. H. Patterson, Computer Architecture: A Quantitative approach, Elsevier, 5th Edition.
3. W. Stalling, Computer Organization and architecture, Pearson Education Asia, 5th Edition.
4. Donald Leach & Albert Malvino, Digital Principles & Applications, McGraw Hill, 7th Edition.

Paper- V: Modern Technologies of Computer Science

UNIT 1:

Introduction to Computer Security: The Challenges of Computer Security, The OSI Security Architecture. Security Attacks (Passive Attacks, Active Attacks). Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service).

UNIT 2:

Introduction to Artificial Intelligence: What is AI ? The Importance of AI. AI and related fields. Introduction to Natural Language Processing.,Application of AI.. Basic Problem solving methods: Production systems-state space search, control strategies, Breadth first search, Depth first search, Heuristic search.

UNIT 3:

Introduction to Machine Learning : Learning Problems - Perspectives and Issues - Concept Learning - Version Spaces and Candidate Eliminations - Inductive bias - Decision Tree learning - Representation Algorithm- Heuristic Space Search.

UNIT 4:

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view. Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.

UNIT 5:

Introduction to Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

Reference Books:

1. Charles P. Pleeger, “Security in Computing”, Pearson Education Asia, 5th Edition, 2001.
2. William Stallings, “Network Security Essentials: Applications and standards”, Person Education Asia, 2000
3. Dan W. Patterson: Introduction to Artificial Intelligence and Expert System, Prentice Hall.
4. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Thing”, Wiley
5. 2. Rajkamal, “Internet of Things: Architecture and Design Principles”, McGraw Hill Educ
6. Data Mining Techniques ; ArunK.Pujari ; University Press.

II- SEMESTER

PAPER-I: CLOUD COMPUTING

Unit-1

Historical development, Vision of Cloud Computing, Characteristic of Cloud Computing As Per NIST, Cloud Computing Reference Model, Cloud computing Environments, Cloud service requirements, cloud and dynamic infrastructure, cloud adaptation and rudiments. Overview of cloud application: ECG Analysis in the cloud, Protein Structure prediction, Gene Expression Data Analysis.

Unit-2

Cloud Computing Architecture: Cloud Reference model types of cloud, cloud interpretability and standards, scalability and fault tolerance, cloud solutions, cloud eco- system, cloud business process management, cloud service management.

Unit-3

Cloud Management and virtualization and technology Resilliency, Provisioning, Asset Management, Concepts of MAP reduce, Cloud governance, High availability and disaster recovery, virtualization, fundamentals concepts of compute storage, networking.

Unit-4

Cloud security: Cloud information security fundamentals, cloud security services, design principles, Secure cloud software requirements, policy implementations, cloud computing security challenges, virtualization security management, cloud computing security architecture.

Unit-5

Market based Management of clouds, federated clouds/ inter cloud: Characterization and definition, Cloud federation status, third party cloud services. Case study: Google App Engine, Hadoop, Amazon, Aneka.

Reference Books:

1. Tomar Saurabh, Cloud Computing, Wiley Pub.
2. Selvi : Mastermind Cloud Computing, TMH, Pub.

PAPER-II: INTERNET OF THINGS (IoT)

UNIT-1:

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

UNIT-2:

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

UNIT-3:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets.

UNIT-4:

Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols .

UNIT-5:

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions.

Reference Book:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition ,Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Internet of things", Apress publications.

PAPER- III: DATA COMMUNICATION & COMPUTER NETWORKS

UNIT-1

Introduction: Theoretical Model for Communication, analog and digital signals Bandwidth, Noise, Channel Capacity, Data-rate, Concepts of Circuit Switching, Message switching and Packet switching with their timing diagrams, comparison of switching techniques, ISDN.

UNIT-2

Evolution of Computer Networks Layered: Network architecture, OSI Layers Model, transmission media topology, error detection & Correction techniques, Parity checks, CRC, Asynchronous and synchronous transmission, TDM, FDM.

UNIT-3

Data Link Layer: Different Types of line discipline, simplex, half duplex and full duplex.**Flow control:** stop and wait protocol, sliding Window Protocol with their efficiency, ARQ techniques & their performances HDLC.

UNIT-4

LAN: Static & Dynamic channel allocation, Media access control for LAN & WAN; **ALOHA:** pure, slotted ALOHA, CSMA, CSMA/CD,**IEEE 802 standards for LAN & MAN:** 802.3, 802.4, 802.5, 802.6 and 802.2 & their **comparison Fast LANs:** fast Ethernet, FDDI.

UNIT- 5

Routing: Definition, Elements of routing techniques, Least Cost Routing algorithm,Dijkstra's algorithm, Bellman-ford algorithm, Routing Strategies, Congestion Control encryption & description techniques, Internet working, Internet and Intranet.

Reference Books:

1. Computer Networks Tanenbaum A. S. PHI.
2. LANs- Keizer
3. Computer Networks - Stalling w., PHI.

PAPER-IV: NETWORK SECURITY

UNIT-1

A Definition of Computer Security, The Challenges of Computer Security, The OSI Security Architecture. Security Attacks (Passive Attacks, Active Attacks). Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service).

UNIT-2

Symmetric Encryption Principle (Cryptography, Cryptanalysis) Symmetric Block Encryption Algorithms (Data Encryption Standard, Triple DES, Advanced Encryption Standard). Stream Ciphers and RC4 (Stream Cipher Structure, The RC4 Algorithm). Cipher Block Modes of Operation (Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Counter Mode).

UNIT-3

Public-Key Cryptography Principles (Public-Key Encryption Structure, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography). Public-Key Cryptography Algorithms (The RSA Public-Key Encryption Algorithm, Diffie-Hellman Key Exchange, Other Public-Key Cryptography Algorithms). Digital Signatures.

UNIT-4

Approaches to Message Authentication: Secure Hash Functions (Hash Function Requirements, Security of Hash Functions, Simple Hash Functions, The SHA Secure Hash Function). Message Authentication Codes (HMAC, MACs Based on Block Ciphers).

UNIT-5

Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats, Malware: Viruses, Worms, Trojan horses, Security Counter Measures; Intrusion Detection Systems, Antivirus Software

Reference Books:

1. W. Stallings, Cryptography and Network Security Principles and practice, 3/e, Pearson Education Asia, 2003. 2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security: Private Communication in a public world”, Prentice Hall India, 2nd Edition, 2002.
2. Charles P. Pleeger, “Security in Computing”, Pearson Education Asia, 5th Edition, 2001.
3. William Stallings, “Network Security Essentials: Applications and standards”, Person Education Asia, 2000.
4. W. Mao, Modern Cryptography: Theory & Practice, Pearson Education, 2004

PAPER-V: INFORMATION SECURITY

UNIT-1

System Security: Desktop Security, Programming Bugs and Malicious code, Database Security**,** Operating System Security, OS SecurityVulnerabilities.

UNIT-2

Security Management: Disaster Recovery, Digital Signature**,** Ethical Hacking, Penetration Testing, Computer Forensics

UNIT-3

Network Security: Network Security Model, Network Security Threats, Firewalls: Overview, Types, Features, User Management**,** Intrusion Detection System, Intrusion Prevention System, Public Key Infrastructure, Digital Signature Schemes

UNIT-4

Internet and Web Application Security-I: Email security: PGP and SMIME, Web Security: Web authentication, Injection Flaws, SQL Injection, Web Browser Security, E-Commerce Security

UNIT-5

Wireless Network Security: Wireless Network Components, Security issues in Wireless Networks, Securing a Wireless Network, Mobile Security

Reference Books:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security”, Prentice Hall, 2nd edition, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.
2. 2. Charles Pfleeger,” Security in Computing”, Prentice Hall, 4 th Edition, 2006, ISBN-10: 0132390779, ISBN-13: 978-01323907744.
3. 3. Ulysess Black, ”Internet Security Protocols: Protecting IP Traffic”, Prentice Hall PTR; 1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.
4. 4. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1- 58720-176-3].