

SEMESTER	COURSE CODE	TYPE OF COURSE	TITLE OF COURSE	CREDITS	
				THEORY	PRACTICAL / TUTORIAL
I	BIT122N	CT-1	INFORMATION TECHNOLOGY: BASIC COMPUTING	4	2
II	BIT223N	CT-1	INFORMATION TECHNOLOGY: COMPUTER ARCHITECTURE AND ORGANISATION	4	2
III	BIT323N	CT-1	INFORMATION TECHNOLOGY: C - PROGRAMMING	4	2
IV	BIT422N	CT-1	INFORMATION TECHNOLOGY: OOPS USING C++	3	1
V	BIT522N	CT-1	INFORMATION TECHNOLOGY: DOT NET	3	1
VI	BIT622N	CT-1	INFORMATION TECHNOLOGY: SYSTEM ANALYSIS AND DESIGN	3	1
VII	BIT722N	CT-1	INFORMATION TECHNOLOGY: MOBILE COMPUTING	3	1
VIII	BIT822N	CT-1	INFORMATION TECHNOLOGY: MACHINE LEARNING	3	1

DIRECTOR IT&SS / CONVENOR BOUGS

BACHELORS WITH INFORMATION TECHNOLOGY AS MINOR

1st SEMESTER

BIT122N: INFORMATION TECHNOLOGY _ BASIC COMPUTING

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT I

Introduction to Computing-Computer Systems, Components of a computer system, Hardware and software, Evolution and generations of computers, and Classification of computers on the basis of capacity, purpose, and generation.

Data representation in digital computer. Number System: Bit, byte, binary, decimal, octal systems and hexadecimal conversion from one system to the other, representation of characters, integers and fractions. Binary Arithmetic: Addition, subtraction and multiplication. Computer Codes-BCD, Gray Code, ASCII and Unicode.

UNIT II

Problem Solving approaches top-down and bottom-up programming. Representation of Algorithm, Flowchart, Pseudo code and Source Code with examples. Transformation of Algorithms into source code. The Role of Algorithms in Computing, Algorithms as a technology, analyzing algorithms, Designing algorithms, Growth of Functions.

Computer languages - Machine language, assembly language, higher level language, 4GL. Translator Programs - Compiler, Interpreter, Assembler.

UNIT III

Operating Systems-Introduction, Features, Functions- Process Management, Memory Management, File Management, Device Management etc. Introduction to different Operating Systems. Different types and classification of Operating Systems.

Data, Information and Knowledge. Database, database management system, database System, Database Applications. Structured and Unstructured data. Big Data. Different kinds of databases.

UNIT IV

Internet, History of Internet, Features and uses of Internet. Internet Architecture, IP Address, Domain Name. Managing the Internet. Introduction to WWW, Web browsers, Websites, Email, Search Engine etc.

Connecting to the Internet, Internet Connections, Internet Address, Internet Services, Uses of Internet, Introduction to Internet of Things (IoT) and Cloud Computing. Introduction to E-commerce, E-governance, E-government, Smart homes with relevant examples like AMS, admissions systems etc.

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCEBOOKS

1. Introduction to Information Technology, V Rajaraman, PHI
2. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
3. Fundamentals of Computers, V. Rajaraman, PHI Publications
4. Computer Fundamentals, Anita Goel, Pearson Education India

Course Title (MULTIDISCIPLINARY COURSE) 1st to 3rd SEMESTER	Course Code	Credits
BITo22I: INFORMATION TECHNOLOGY (BASIC COMPUTING)	BIT122I	03

UNIT I

Definition of Computer, Characteristics of Computer, Components of a Computer System, Hardware and Software, Classification of Computers, Evolution and Generations of Computers, System Software – Operating System and its Functions, Application Software – Office Packages etc., Input and Output Devices.

Data representation in Digital Computer. Number System and their Conversions.

UNIT II

Problem Solving – Algorithm, Flowchart, Pseudocode and Source Code. Representation of Algorithm, Flowchart, Pseudo code with examples.

Computer languages - Machine language, Assembly language, Higher level languages, 4GL. Translator Programs - Compiler, Interpreter, Assembler.

Internet, History of Internet, Features and uses of Internet. Connecting to Internet, Internet Connections, Internet Services. Introduction to WWW, Web browsers, Websites, Email, Search Engine etc. URL, IP Address, Domain Name. Introduction to E-commerce, E-governance, E-government, with relevant examples like AMS, Admissions System etc.

UNIT III

MS office: Introduction to MS office, Components and Features, Using Office in Online and Offline Mode.

MS Word: Creating Letter, Table, Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, Auto Text, Inserting Picture, Word Art.

MS Excel: Introduction to Excel, Sorting, Formulas, Graphs, Scientific Functions.

PowerPoint: Introduction to PowerPoint, Creation of Slides, Inserting Pictures, Preparing Slide Show with Animation.

Reference Books

1. Introduction to Information Technology, V Rajaraman, PHI
2. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
3. Fundamentals of Computers, V. Rajaraman, PHI Publications
4. Computer Fundamentals, Anita Goel, Pearson Education India
5. Mastering MS Office, Bittu Kumar, V&S Publishers.

**FYUGP CURRICULAR FRAMEWORK FOR BACHELORS PROGRAMME WITH APPLIED
INFORMATION TECHNOLOGY AS MINOR**

(FOR STUDENTS WITH COMPUTER APPLICATIONS / INFORMATION TECHNOLOGY AS MINOR ONLY)

SEMESTER	COURSE CODE	TYPE OF COURSE	TITLE OF COURSE	CREDITS	
				THEORY	PRACTICAL / TUTORIAL
I	AIT124N	CT-1	APPLIED IT: DIGITAL ELECTRONICS	4	2
II	AIT223N	CT-1	APPLIED IT: OPEN-SOURCE TOOLS AND TECHNOLOGIES	4	2
III	AIT323N	CT-1	APPLIED IT: CLOUD COMPUTING	4	2
IV	AIT422N	CT-1	APPLIED IT: IOT FUNDAMENTALS	3	1
V	AIT522N	CT-1	APPLIED IT: DESIGN ANALYSIS AND ALGORITHM	3	1
VI	AIT622N	CT-1	APPLIED IT: DATA MINING	3	1
VII	AIT722N	CT-1	APPLIED IT: ARTIFICIAL INTELLIGENCE	3	1
VIII	AIT822N	CT-1	APPLIED IT: LATEX	3	1

DIRECTOR IT&SS / CONVENOR BOUGS

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

1st SEMESTER

AIT122N: APPLIED INFORMATION TECHNOLOGY _ DIGITAL ELECTRONICS

CREDITS: THEORY: 4; PRACTICALS: 2

UNIT I:

NUMBER SYSTEMS: Binary, Octal, Decimal, Hexadecimal. Number base conversions,

Binary Arithmetic: Binary Addition, Decimal Subtraction Using 9's and 10's Complement, Binary Subtraction Using 1's and 2's Complement, Multiplication and Division.

LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR.

Implementations of Logic Functions using gates, NAND-NOR implementations

Unit-II:

BOOLEAN ALGEBRA: Boolean postulates and laws – De-Morgan's Theorem, Principle of Duality, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method.

Unit-III:

Combinational Circuits: Half Adder, Full Adder, Parallel Adder, Half Subtractor, Full Subtractor, 4-Bit Binary Adder Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder, Parity Detector. Implementation of combinational logic using MUX, BCD to 7 segment decoders.

Unit IV:

SEQUENTIAL CIRCUITS: Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops. Asynchronous /Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters. Design of Synchronous counters: state diagram, Circuit implementation. Shift registers.

PRACTICAL: (2-CREDITS)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV of Theory Course*

SUGGESTED READING:

- 1) Navaneeth, Kale and Gokhale, "Digital and Analogue Technique". ISBN-81-225-0153-2
- 2) Soumitra Mandal, "Digital Electronics", TMH, ISBN 0-07015382-5
- 3) Modern Digital Electronics by R. P. Jain, Tata McGrawHill.
- 4). Digital Fundamentals by Thomas Floyd, Prentice Hall.
- 5). Digital Logic and computer Design by' Morris Mano, PHI pvt. Ltd.
- 6) Jacob Millman, Christos Halkias, Chetan D Parikhu, Integrated Electronics, Tata Mc Graw

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

2nd SEMESTER

BIT223J: INFORMATION TECHNOLOGY _ COMPUTER ARCHITECTURE AND ORGANIZATION

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

Basic Structure of computer, and basic operational concepts, registers (general purpose registers, accumulator, status register, program counter, stack pointer, word size and register size).data movement among registers.

UNIT-II

Computer Instructions (input/output, instructions, register referenced instructions, direct addressing mode memory referenced instructions), how an instruction is executed? Instructions formats, bus structure and addressing modes.

UNIT-III

ALU & control unit organization: simple ALU organization, floating point ALU, Arithmetic processors, control unit organization: functional requirements of a control unit, structure of a control unit, micro-programmed and hardware control unit.

UNIT-IV

I/O organization: Peripheral devices(input/output devices),synchronous and asynchronous communication, I/O(input/output)interface, (serial and parallel points),data transfer and synchronization, programmed I/O interrupt initiated I/O, DMA, interrupts (software and hardware).

Main Memory (ROM, RAM-static and dynamic RAM), design of main memory (RAM 4x4), virtual memory (paging & page replacement).

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

V.C Hamacher, A.G Vranesic and S.G Zaky,” Computer Organization”

J.P Hayes,” Computer System Architecture”, McGraw Hill

Morris Mano,” Computer System Architecture”, Prentice Hall of India

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

2nd SEMESTER

AIT223N: APPLIED INFORMATION TECHNOLOGY _ OPEN-SOURCE TOOLS AND TECHNOLOGIES

CREDITS: THEORY: 4; PRACTICALS: 2

UNIT-I

Introduction: Need of Open Sources – Advantages of Open Sources – Applications – FOSS – FOSS usage - Free Software Movement, Commercial aspects of Open-Source movement -Certification courses issues - global and Indian. Application of Open Sources–Commercial aspects of Open-Source movement- Contrasting and comparing open source vs. traditional development Methodologies

UNIT-II

Introduction to Linux, History of Linux – Features of Linux - Drawbacks of Linux, Components of Linux. Difference Between Linux and Windows., Difference Between Linux and Unix, Linux is Virus proof, Various Linux Distributions, Pros and Cons Understanding Files and Directories in Linux - File Structure and hierarchy, File Permissions, root, shell, Using VI editor and command associated with it.

UNIT III

Linux Commands and Utilities : Basic Commands –mkdir, touch, ls, pwd, cd, chmod, df, du, dd, adduser, passwd, rm, rmdir, date. cat, tail, cmp, diff, wc, sort, rmdir, cp, more, who, whoami, mv, chmod, kill, write, wall, merge, mail, news – pipes, filters and redirection utilities.

UNIT-IV

Shell Scripts: Creating and executing simple shell programs – variables – special characters – comparison of expressions – iteration statements – conditional statements – functions.

Open-source software tools: Browsers – Processors – Compilers.

Practicals: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

References

1. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers; 2005.
2. Matt Welsh, Matthias KalleDalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers, 2002
3. The Linux Kernel Book Rem Card, Eric Dumas and Frank Mevel Wiley Publications sons, 2003
4. Linux - The Complete Reference Richard Peterson, Tata McGraw Hill, New Delhi

BACHELORS WITH INFORMATION TECHNOLOGY AS MINOR

2nd SEMESTER

BIT223N: INFORMATION TECHNOLOGY _ COMPUTER ARCHITECTURE AND ORGANIZATION

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

Basic Structure of computer, and basic operational concepts, registers (general purpose registers, accumulator, status register, program counter, stack pointer, word size and register size).data movement among registers.

UNIT-II

Computer Instructions (input/output, instructions, register referenced instructions, direct addressing mode memory referenced instructions), how an instruction is executed? Instructions formats, bus structure and addressing modes.

UNIT-III

ALU & control unit organization: simple ALU organization, floating point ALU, Arithmetic processors, control unit organization: functional requirements of a control unit, structure of a control unit, micro-programmed and hardware control unit.

UNIT-IV

I/O organization: Peripheral devices(input/output devices),synchronous and asynchronous communication, I/O(input/output)interface, (serial and parallel points),data transfer and synchronization, programmed I/O interrupt initiated I/O, DMA, interrupts (software and hardware).

Main Memory (ROM, RAM-static and dynamic RAM), design of main memory (RAM 4x4), virtual memory (paging & page replacement).

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

V.C Hamacher, A.G Vranesic and S.G Zaky,” Computer Organization”

J.P Hayes,” Computer System Architecture”, McGraw Hill

Morris Mano,” Computer System Architecture”, Prentice Hall of India

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

3rd SEMESTER

BIT323J: INFORMATION TECHNOLOGY _ C-PROGRAMMING

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

C Fundamentals- Character set, Identifiers and keywords, Data Types, Constants, Variables and Arrays, Declarations, Operators & Expressions, Library functions, Statements, Symbolic Constants.

Operators- Arithmetic operators, Unary operators, Relational operators, Logical operators

Data Input and Output- printf(), scanf(), getc(), getch(), getchar(), putc(), putchar(), gets(), puts().

UNIT-II

Storage Class in C- Automatic, Register, static, external

Control Statements- if statement, if-else statement, nested if statement, got statement, switch-case statement

Loops- while (), do-while (), for (), nested loops, break, continue, exit (), comma operator.

UNIT-III

Arrays- Arrays, one dimensional array, Various Operation on Array (Inserting of Element, Deleting of Element, Sorting and Searching) and two-dimensional arrays (Matrix Addition, Transpose of Matrix, Matrix Multiplication). Arrays and strings – standard string functions

Functions- defining function, accessing function, passing arguments to functions, function prototype, recursion, passing array to a function.

Pointers - pointer declaration, operators and pointers, passing pointer to a function, pointer and one-dimensional arrays, array of pointers, Dynamic memory allocation.

UNIT-IV

Structures and Unions- defining a structure, processing a structure, user defined data type, sorting structures, passing structure to a function. Overview of union.

File Management - introduction, defining and opening a file, closing a file. Input/output operations file. Random access file. Command line arguments.

Practical: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

SUGGESTED READING:

1. “Programming in C” by Schaum Series
2. “Let Us C” by Yashwant Kanitkar, BPB Publications
3. “Programming in ANSCI C” by E. Balaguruswamy, Tata McGraw Hill
4. “Art and Craft of C” by R.B. Patel.
5. “Programming with C” by Brayan Gottfried, Tata McGraw Hill

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

3rd SEMESTER

AIT323N: APPLIED INFORMATION TECHNOLOGY _ CLOUD COMPUTING

CREDITS: THEORY: 4; TUTORIAL: 2

Unit – I

Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio-computing, Mobile Computing, Quantum Computing, Optical Computing, Nano-computing, Network Computing. Cloud Computing Fundamentals: Motivation, Need, Definition of Cloud Computing. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services.

Unit – II

Cloud Computing Architecture: cloud Architecture, User/Client Layer, Network Layer, Cloud Management Layer, Hardware Resource Layer, Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access Networking.

UNIT – III

Cloud Computing Management: Cloud Application, Benefits and Drawbacks Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud, Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Introduction to Open-Source Tools for IaaS, Paas & SaaS: Apache.

UNIT – IV

Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multi-core Technology: Multi-core Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0: Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education.

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

1. Essentials of Cloud Computing, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2]
2. Raj Kumar Buyya, James Broberg and rezei M.Goscinski, -Cloud Computing: Principles and Paradigms, - Wiley 2011.
3. Srinivasan, J. Suresh, -Cloud Computing – a Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
4. Toby Velte, Anthony Velte, Robert Elsenpeter, - Cloud Computing, a Practical Approach - McGraw Hill, 2010 [ISBN: 0071626948]

BACHELORS WITH INFORMATION TECHNOLOGY AS MINOR

3rd SEMESTER

BIT323N: INFORMATION TECHNOLOGY _ C-PROGRAMMING

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

C Fundamentals- Character set, Identifiers and keywords, Data Types, Constants, Variables and Arrays, Declarations, Operators & Expressions, Library functions, Statements, Symbolic Constants.

Operators- Arithmetic operators, Unary operators, Relational operators, Logical operators

Data Input and Output- printf(), scanf(), getc(), getch(), getchar(), putc(), putchar(), gets(), puts().

UNIT-II

Storage Class in C- Automatic, Register, static, external

Control Statements- if statement, if-else statement, nested if statement, goto statement, switch-case statement

Loops- while (), do-while (), for (), nested loops, break, continue, exit (), comma operator.

UNIT-III

Arrays- Arrays, one dimensional array, Various Operation on Array (Inserting of Element, Deleting of Element, Sorting and Searching) and two-dimensional arrays (Matrix Addition, Transpose of Matrix, Matrix Multiplication). Arrays and strings – standard string functions

Functions- defining function, accessing function, passing arguments to functions, function prototype, recursion, passing array to a function.

Pointers - pointer declaration, operators and pointers, passing pointer to a function, pointer and one-dimensional arrays, array of pointers, Dynamic memory allocation.

UNIT-IV

Structures and Unions- defining a structure, processing a structure, user defined data type, sorting structures, passing structure to a function. Overview of union.

File Management - introduction, defining and opening a file, closing a file. Input/output operations file. Random access file. Command line arguments.

Practical: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

SUGGESTED READING:

1. "Programming in C" by Schaum Series
2. "Let Us C" by Yashwant Kanitkar, BPB Publications
3. "Programming in ANSCI C" by E. Balaguruswamy, Tata McGraw Hill
4. "Art and Craft of C" by R.B. Patel.
5. "Programming with C" by Brayan Gottfried, Tata McGraw Hill

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR
4th SEMESTER

BIT422J1: INFORMATION TECHNOLOGY _ OOPS USING C++

CREDITS: THEORY: 3; PRACTICAL: 1

THEORY (3 CREDITS)

UNIT-I:

Introduction to object-oriented approach (OOA) and object-oriented programming (OOP), concept of object and class.

Features of OOP-Encapsulation, Abstraction, Inheritance and Polymorphism. Advantages of OOP over structured programming.

Introduction to C++ with general basic features of operators and control structure (if, if-else, switch-case, while, do-while, for, etc.)

UNIT-II:

Classes-specifying class, defining member functions and member variables, scope resolution operator, access specifiers and accessing class members, friend class, static class members.

Objects-Dynamic allocation operators (New and Delete), arrays of objects, object as function argument and functions returning objects, object assignment.

Functions-Inline functions, friend functions. Default arguments, reference variables.

Constructors-parameterized, multiple constructors in a class, copy constructor, destructor. Function overloading, operator overloading (unary, binary).

UNIT-III:

Inheritance-Defining derived classes. Inheritance types-single, multilevel, multiple, hierarchical and hybrid inheritance. Virtual base classes.

Pointers-Pointer to objects, this pointer, pointer to derived class.

Polymorphism-Virtual functions, pure virtual functions, abstract classes.

TUTORIALS: (1 CREDIT)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-III*

BOOKS:

- 1 Object oriented programming with C++ by E Balaguruswamy
- 2 The complete reference C++ by Herbert Schildt
- 3 Object oriented programming in C++ by Robert Lafore

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR
4th SEMESTER

BIT422J2: INFORMATION TECHNOLOGY _ OPERATING SYSTEMS

CREDITS: THEORY: 4; PRACTICAL: 2

THEORY (4 CREDITS)

UNIT I

Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel. Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR.

UNIT II

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation –Fixed and variable partition–Internal and External fragmentation and Compaction. Paging: Principle of operation – Page allocation–Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT III

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.

UNIT IV

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed).

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TUTORIALS: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

4th SEMESTER

BIT422J3: INFORMATION TECHNOLOGY _ SOFTWARE ENGINEERING

CREDITS: THEORY: 4; PRACTICAL: 2

THEORY (4 CREDITS)

UNIT-I

Software process, SW Product, Characteristics of good SW Product, SW process models: waterfall, prototyping, RAD, incremental, and generic spiral model, 4G Techniques.

SW requirements analysis, types of requirements and steps involved in SRA, SW requirements Specifications, guidelines and prototypes for good SRS.

UNIT-II

Structured analysis and design, representation techniques used data modeling (ER Diagrams)

Process Modeling (DFD), Behavioral modeling (State-transition Diagram)

Software design concepts and principals, procedural and data abstraction, top-down design, call-return architecture, structural partitioning, characterization of effective modular design (functional independence, Cohesion, Coupling), SW architecture styles (data-centered, dataflow and layered architectures).

UNIT-III

Software Testing: Need for SW Testing, testing principle, approaches to the design test cases, black-box and white-box testing, Phases in testing activity: unit, integration, validation and system tests, concepts of verification and validation.

UNIT-IV

Software project management concepts, project planning and resource estimation techniques, simple Boehm model, risk analysis and management, project scheduling and tracking, software quality assurance, SW configuration management concepts: baseline, version Id, Introduction to CASE tools, categories of commonly used CASE Tools.

TUTORIALS: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

BOOKS RECOMMENDED:

1. Software Engineering—Roger Pressman
2. Fundamentals of Software Engineering—Ghezzi, Jazayeri
3. Software Engineering—Ian Sommerville

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

4th SEMESTER

AIT422N: APPLIED INFORMATION TECHNOLOGY _ IOT FUNDAMENTALS

CREDITS: THEORY: 3; TUTORIALS: 1

UNIT-I

Introduction to IoT: Definition, history, and evolution, Key components, and characteristics. IoT Architecture: Sensor nodes, Communication protocols (e.g., MQTT, CoAP), IoT Devices and Sensors: Types of sensors and actuators, Sensor networks, Data acquisition and processing.

UNIT-II

Communication Technologies: Wireless communication (e.g., Wi-Fi, Bluetooth, Zigbee), IoT protocols (e.g., MQTT, HTTP, CoAP). Data Management and Analytics: Data storage and processing in IoT, Big Data analytics & Edge computing.

Security and Privacy: Threats and vulnerabilities in IoT, Authentication and access control & Encryption and data integrity.

UNIT-III

IoT Applications: Smart homes and cities, Industrial IoT (IIoT), Healthcare applications & Agriculture and environmental monitoring.

Ethical and Social Implications: Privacy concerns, Ethical considerations in IoT design and deployment, Regulatory issues.

TUTORIALS: (1-CREDIT)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-III*

REFERENCES:

This syllabus provides a comprehensive introduction to IoT fundamentals while allowing for flexibility in terms of additional readings, guest lectures, and hands-on activities.

- "Building Internet of Things with the Arduino" by Charalampos Doukas
- "Designing Connected Products: UX for the Consumer Internet of Things" by Claire Rowland, Elizabeth Goodman, Martin Charlier, Ann Light
- "Practical Internet of Things Security" by Brian Russell, Drew Van Duren
- "The Fourth Industrial Revolution" by Klaus Schwab
- "Internet of Things: Principles and Paradigms" by Rajkumar Buyya, Amir Vahid Dastjerdi

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

2nd SEMESTER

BIT223J: INFORMATION TECHNOLOGY _ COMPUTER ARCHITECTURE AND ORGANIZATION

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

Basic Structure of computer, and basic operational concepts, registers (general purpose registers, accumulator, status register, program counter, stack pointer, word size and register size).data movement among registers.

UNIT-II

Computer Instructions (input/output, instructions, register referenced instructions, direct addressing mode memory referenced instructions), how an instruction is executed? Instructions formats, bus structure and addressing modes.

UNIT-III

ALU & control unit organization: simple ALU organization, floating point ALU, Arithmetic processors, control unit organization: functional requirements of a control unit, structure of a control unit, micro-programmed and hardware control unit.

UNIT-IV

I/O organization: Peripheral devices(input/output devices),synchronous and asynchronous communication, I/O(input/output)interface, (serial and parallel points),data transfer and synchronization, programmed I/O interrupt initiated I/O, DMA, interrupts (software and hardware).

Main Memory (ROM, RAM-static and dynamic RAM), design of main memory (RAM 4x4), virtual memory (paging & page replacement).

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

V.C Hamacher, A.G Vranesic and S.G Zaky,” Computer Organization”

J.P Hayes,” Computer System Architecture”, McGraw Hill

Morris Mano,” Computer System Architecture”, Prentice Hall of India

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

2nd SEMESTER

AIT223N: APPLIED INFORMATION TECHNOLOGY _ OPEN-SOURCE TOOLS AND TECHNOLOGIES

CREDITS: THEORY: 4; PRACTICALS: 2

UNIT-I

Introduction: Need of Open Sources – Advantages of Open Sources – Applications – FOSS – FOSS usage - Free Software Movement, Commercial aspects of Open-Source movement -Certification courses issues - global and Indian. Application of Open Sources–Commercial aspects of Open-Source movement- Contrasting and comparing open source vs. traditional development Methodologies

UNIT-II

Introduction to Linux, History of Linux – Features of Linux - Drawbacks of Linux, Components of Linux. Difference Between Linux and Windows., Difference Between Linux and Unix, Linux is Virus proof, Various Linux Distributions, Pros and Cons Understanding Files and Directories in Linux - File Structure and hierarchy, File Permissions, root, shell, Using VI editor and command associated with it.

UNIT III

Linux Commands and Utilities : Basic Commands –mkdir, touch, ls, pwd, cd, chmod, df, du, dd, adduser, passwd, rm, rmdir, date. cat, tail, cmp, diff, wc, sort, rmdir, cp, more, who, whoami, mv, chmod, kill, write, wall, merge, mail, news – pipes, filters and redirection utilities.

UNIT-IV

Shell Scripts: Creating and executing simple shell programs – variables – special characters – comparison of expressions – iteration statements – conditional statements – functions.

Open-source software tools: Browsers – Processors – Compilers.

Practicals: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

References

1. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers; 2005.
2. Matt Welsh, Matthias KalleDalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers, 2002
3. The Linux Kernel Book Rem Card, Eric Dumas and Frank Mevel Wiley Publications sons, 2003
4. Linux - The Complete Reference Richard Peterson, Tata McGraw Hill, New Delhi

BACHELORS WITH INFORMATION TECHNOLOGY AS MINOR

2nd SEMESTER

BIT223N: INFORMATION TECHNOLOGY _ COMPUTER ARCHITECTURE AND ORGANIZATION

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

Basic Structure of computer, and basic operational concepts, registers (general purpose registers, accumulator, status register, program counter, stack pointer, word size and register size).data movement among registers.

UNIT-II

Computer Instructions (input/output, instructions, register referenced instructions, direct addressing mode memory referenced instructions), how an instruction is executed? Instructions formats, bus structure and addressing modes.

UNIT-III

ALU & control unit organization: simple ALU organization, floating point ALU, Arithmetic processors, control unit organization: functional requirements of a control unit, structure of a control unit, micro-programmed and hardware control unit.

UNIT-IV

I/O organization: Peripheral devices(input/output devices),synchronous and asynchronous communication, I/O(input/output)interface, (serial and parallel points),data transfer and synchronization, programmed I/O interrupt initiated I/O, DMA, interrupts (software and hardware).

Main Memory (ROM, RAM-static and dynamic RAM), design of main memory (RAM 4x4), virtual memory (paging & page replacement).

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

V.C Hamacher, A.G Vranesic and S.G Zaky,” Computer Organization”

J.P Hayes,” Computer System Architecture”, McGraw Hill

Morris Mano,” Computer System Architecture”, Prentice Hall of India

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

3rd SEMESTER

BIT323J: INFORMATION TECHNOLOGY _ C-PROGRAMMING

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

C Fundamentals- Character set, Identifiers and keywords, Data Types, Constants, Variables and Arrays, Declarations, Operators & Expressions, Library functions, Statements, Symbolic Constants.

Operators- Arithmetic operators, Unary operators, Relational operators, Logical operators

Data Input and Output- printf(), scanf(), getc(), getch(), getchar(), putc(), putchar(), gets(), puts().

UNIT-II

Storage Class in C- Automatic, Register, static, external

Control Statements- if statement, if-else statement, nested if statement, goto statement, switch-case statement

Loops- while (), do-while (), for (), nested loops, break, continue, exit (), comma operator.

UNIT-III

Arrays- Arrays, one dimensional array, Various Operation on Array (Inserting of Element, Deleting of Element, Sorting and Searching) and two-dimensional arrays (Matrix Addition, Transpose of Matrix, Matrix Multiplication). Arrays and strings – standard string functions

Functions- defining function, accessing function, passing arguments to functions, function prototype, recursion, passing array to a function.

Pointers - pointer declaration, operators and pointers, passing pointer to a function, pointer and one-dimensional arrays, array of pointers, Dynamic memory allocation.

UNIT-IV

Structures and Unions- defining a structure, processing a structure, user defined data type, sorting structures, passing structure to a function. Overview of union.

File Management - introduction, defining and opening a file, closing a file. Input/output operations file. Random access file. Command line arguments.

Practical: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

SUGGESTED READING:

1. "Programming in C" by Schaum Series
2. "Let Us C" by Yashwant Kanitkar, BPB Publications
3. "Programming in ANSCI C" by E. Balaguruswamy, Tata McGraw Hill
4. "Art and Craft of C" by R.B. Patel.
5. "Programming with C" by Brayan Gottfried, Tata McGraw Hill

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

3rd SEMESTER

AIT323N: APPLIED INFORMATION TECHNOLOGY _ CLOUD COMPUTING

CREDITS: THEORY: 4; TUTORIAL: 2

Unit – I

Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio-computing, Mobile Computing, Quantum Computing, Optical Computing, Nano-computing, Network Computing. Cloud Computing Fundamentals: Motivation, Need, Definition of Cloud Computing. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services.

Unit – II

Cloud Computing Architecture: cloud Architecture, User/Client Layer, Network Layer, Cloud Management Layer, Hardware Resource Layer, Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access Networking.

UNIT – III

Cloud Computing Management: Cloud Application, Benefits and Drawbacks Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud, Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Introduction to Open-Source Tools for IaaS, Paas & SaaS: Apache.

UNIT – IV

Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multi-core Technology: Multi-core Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0: Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education.

TUTORIAL: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES:

1. Essentials of Cloud Computing, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2]
2. Raj Kumar Buyya, James Broberg and rezei M.Goscinski, -Cloud Computing: Principles and Paradigms, - Wiley 2011.
3. Srinivasan, J. Suresh, -Cloud Computing – a Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
4. Toby Velte, Anthony Velte, Robert Elsenpeter, - Cloud Computing, a Practical Approach - McGraw Hill, 2010 [ISBN: 0071626948]

BACHELORS WITH INFORMATION TECHNOLOGY AS MINOR

3rd SEMESTER

BIT323N: INFORMATION TECHNOLOGY _ C-PROGRAMMING

CREDITS: THEORY: 4; PRACTICAL: 2

UNIT-I

C Fundamentals- Character set, Identifiers and keywords, Data Types, Constants, Variables and Arrays, Declarations, Operators & Expressions, Library functions, Statements, Symbolic Constants.

Operators- Arithmetic operators, Unary operators, Relational operators, Logical operators

Data Input and Output- printf(), scanf(), getc(), getch(), getchar(), putc(), putchar(), gets(), puts().

UNIT-II

Storage Class in C- Automatic, Register, static, external

Control Statements- if statement, if-else statement, nested if statement, goto statement, switch-case statement

Loops- while (), do-while (), for (), nested loops, break, continue, exit (), comma operator.

UNIT-III

Arrays- Arrays, one dimensional array, Various Operation on Array (Inserting of Element, Deleting of Element, Sorting and Searching) and two-dimensional arrays (Matrix Addition, Transpose of Matrix, Matrix Multiplication). Arrays and strings – standard string functions

Functions- defining function, accessing function, passing arguments to functions, function prototype, recursion, passing array to a function.

Pointers - pointer declaration, operators and pointers, passing pointer to a function, pointer and one-dimensional arrays, array of pointers, Dynamic memory allocation.

UNIT-IV

Structures and Unions- defining a structure, processing a structure, user defined data type, sorting structures, passing structure to a function. Overview of union.

File Management - introduction, defining and opening a file, closing a file. Input/output operations file. Random access file. Command line arguments.

Practical: (2-Credits)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

SUGGESTED READING:

1. "Programming in C" by Schaum Series
2. "Let Us C" by Yashwant Kanitkar, BPB Publications
3. "Programming in ANSCI C" by E. Balaguruswamy, Tata McGraw Hill
4. "Art and Craft of C" by R.B. Patel.
5. "Programming with C" by Brayan Gottfried, Tata McGraw Hill

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR
4th SEMESTER

BIT422J1: INFORMATION TECHNOLOGY _ OOPS USING C++

CREDITS: THEORY: 3; PRACTICAL: 1

THEORY (3 CREDITS)

UNIT-I:

Introduction to object-oriented approach (OOA) and object-oriented programming (OOP), concept of object and class.

Features of OOP-Encapsulation, Abstraction, Inheritance and Polymorphism. Advantages of OOP over structured programming.

Introduction to C++ with general basic features of operators and control structure (if, if-else, switch-case, while, do-while, for, etc.)

UNIT-II:

Classes-specifying class, defining member functions and member variables, scope resolution operator, access specifiers and accessing class members, friend class, static class members.

Objects-Dynamic allocation operators (New and Delete), arrays of objects, object as function argument and functions returning objects, object assignment.

Functions-Inline functions, friend functions. Default arguments, reference variables.

Constructors-parameterized, multiple constructors in a class, copy constructor, destructor. Function overloading, operator overloading (unary, binary).

UNIT-III:

Inheritance-Defining derived classes. Inheritance types-single, multilevel, multiple, hierarchical and hybrid inheritance. Virtual base classes.

Pointers-Pointer to objects, this pointer, pointer to derived class.

Polymorphism-Virtual functions, pure virtual functions, abstract classes.

TUTORIALS: (1 CREDIT)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-III*

BOOKS:

- 1 Object oriented programming with C++ by E Balaguruswamy
- 2 The complete reference C++ by Herbert Schildt
- 3 Object oriented programming in C++ by Robert Lafore

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR
4th SEMESTER

BIT422J2: INFORMATION TECHNOLOGY _ OPERATING SYSTEMS

CREDITS: THEORY: 4; PRACTICAL: 2

THEORY (4 CREDITS)

UNIT I

Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel. Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR.

UNIT II

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation –Fixed and variable partition–Internal and External fragmentation and Compaction. Paging: Principle of operation – Page allocation–Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT III

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.

UNIT IV

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed).

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TUTORIALS: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

REFERENCES

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
4. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR

4th SEMESTER

BIT422J3: INFORMATION TECHNOLOGY _ SOFTWARE ENGINEERING

CREDITS: THEORY: 4; PRACTICAL: 2

THEORY (4 CREDITS)

UNIT-I

Software process, SW Product, Characteristics of good SW Product, SW process models: waterfall, prototyping, RAD, incremental, and generic spiral model, 4G Techniques.

SW requirements analysis, types of requirements and steps involved in SRA, SW requirements Specifications, guidelines and prototypes for good SRS.

UNIT-II

Structured analysis and design, representation techniques used data modeling (ER Diagrams)

Process Modeling (DFD), Behavioral modeling (State-transition Diagram)

Software design concepts and principals, procedural and data abstraction, top-down design, call-return architecture, structural partitioning, characterization of effective modular design (functional independence, Cohesion, Coupling), SW architecture styles (data-centered, dataflow and layered architectures).

UNIT-III

Software Testing: Need for SW Testing, testing principle, approaches to the design test cases, black-box and white-box testing, Phases in testing activity: unit, integration, validation and system tests, concepts of verification and validation.

UNIT-IV

Software project management concepts, project planning and resource estimation techniques, simple Boehm model, risk analysis and management, project scheduling and tracking, software quality assurance, SW configuration management concepts: baseline, version Id, Introduction to CASE tools, categories of commonly used CASE Tools.

TUTORIALS: (2-CREDITS)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-IV*

BOOKS RECOMMENDED:

1. Software Engineering—Roger Pressman
2. Fundamentals of Software Engineering—Ghezzi, Jazayeri
3. Software Engineering—Ian Sommerville

BACHELORS WITH APPLIED INFORMATION TECHNOLOGY AS MINOR

4th SEMESTER

AIT422N: APPLIED INFORMATION TECHNOLOGY _ IOT FUNDAMENTALS

CREDITS: THEORY: 3; TUTORIALS: 1

UNIT-I

Introduction to IoT: Definition, history, and evolution, Key components, and characteristics. IoT Architecture: Sensor nodes, Communication protocols (e.g., MQTT, CoAP), IoT Devices and Sensors: Types of sensors and actuators, Sensor networks, Data acquisition and processing.

UNIT-II

Communication Technologies: Wireless communication (e.g., Wi-Fi, Bluetooth, Zigbee), IoT protocols (e.g., MQTT, HTTP, CoAP). Data Management and Analytics: Data storage and processing in IoT, Big Data analytics & Edge computing.

Security and Privacy: Threats and vulnerabilities in IoT, Authentication and access control & Encryption and data integrity.

UNIT-III

IoT Applications: Smart homes and cities, Industrial IoT (IIoT), Healthcare applications & Agriculture and environmental monitoring.

Ethical and Social Implications: Privacy concerns, Ethical considerations in IoT design and deployment, Regulatory issues.

TUTORIALS: (1-CREDIT)

Note: *The Tutorial Component shall be based on the Unit-I to Unit-III*

REFERENCES:

This syllabus provides a comprehensive introduction to IoT fundamentals while allowing for flexibility in terms of additional readings, guest lectures, and hands-on activities.

- "Building Internet of Things with the Arduino" by Charalampos Doukas
- "Designing Connected Products: UX for the Consumer Internet of Things" by Claire Rowland, Elizabeth Goodman, Martin Charlier, Ann Light
- "Practical Internet of Things Security" by Brian Russell, Drew Van Duren
- "The Fourth Industrial Revolution" by Klaus Schwab
- "Internet of Things: Principles and Paradigms" by Rajkumar Buyya, Amir Vahid Dastjerdi

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – I)

5th SEMESTER

BIT522J1 INFORMATION TECHNOLOGY _ DOT NET TECHNOLOGIES

CREDITS: THEORY-03; PRACTICAL-01

THEORY (3 CREDITS)

UNIT I

Introduction to .NET framework: Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation Automatic Memory Management. Language Concepts and the CLR: Visual Studio .NET - Using the .NET Framework. The Framework Class Library: .NET objects - ASP .NET - .NET web services – Windows Forms. **Elements:** Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow.

UNIT II

Decision statements – if ..then, if..then..else, select. Case– Loop statements – while..end while, do..loop, for..next, for..each..next. **Types:** Value data types – Structures, Enumerations. Reference data types- Single-dimensional – multi-dimensional arrays – jagged arrays – dynamic arrays.

Windows programming: Creating windows Forms – windows controls – Button, Check box, Combo box, Label, List box, Radio Button, Text box. Events – Click, close, Deactivate, Load, Mousemove, Mousedown, MouseUp.

Menus and Dialog Boxes: Creating menus – menu items – context menu - Using dialog boxes – showDialog() method.

UNIT III

Application Development Using ADO .NET

Features of ADO.NET: Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset.

Accessing Data with ADO.NET: Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

PRACTICAL (1 - CREDIT)

Note: *The Practical Component shall be based on the Unit-I to Unit-III*

REFERENCE BOOKS:

- Introduction to Visual basic.NET - NIIT Prentice Hall of India,2005
- Introducing Microsoft .NET- David S. Platt Microsoft Press”, Saarc Edition, 2001
- Introduction to Microsoft® ASP.NET Work Book - Microsoft- Microsoft Press
- Developing XML Web Services Using Microsoft® ASP.NET -Microsoft- Microsoft Press
- Designing Microsoft ASP.NET Applications-Douglas J. Reilly-Microsoft Press
- ASP.NET-Danny Ryan and Tommy Ryan-Hungry Minds Maran Graphics

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – II)
5th SEMESTER
BIT522J2: INFORMATION TECHNOLOGY _ DATABASE MANAGEMENT SYSTEM
CREDITS: THEORY-04; INTERNSHIP / TUTORIAL-02

THEORY (4 CREDITS)

UNIT-I

INTRODUCTION:

Introductory concepts of Databases, Traditional File processing system and its drawbacks, purpose and evolution of data base system, Introduction and applications of DBMS, advantages & disadvantages of DBMS.

Basic concepts of database and database users, characteristics of database, Database System architecture and levels, components of a DBMS, classification of DBMS users, DBMS facilities, structure of a DBMS.

UNIT-II

DATA MODEL CLASSIFICATION:

Network and Hierarchical models, relational model, structure of relational databases–domain, relations, relational algebra & tuple relational calculus.

DATA MODELING USING THE ENTITY-RELATIONSHIP APPROACH: Basic Concepts, Design process, Constraints, keys, ER Diagrams.

UNIT-III

RELATIONAL DATABASE DESIGN:

Functional Dependencies–definition, trivial and non-trivial FD.

NORMALIZATION FOR RELATIONAL DATABASE:

Normal forms 1NF, 2NF, 3NF, Decomposition using FD- Dependency preservation, BCNF, Multivalued Dependency, 4NF, Join Dependency and 5NF.

UNIT-IV

RELATIONAL DATABASE MANIPULATION:

SQL-A relational database language, data definition in SQL, data manipulation in SQL, views and queries in SQL, specifying constraints and indexes in SQL(ORACLE), creating triggers, stored procedures, functions & cursors in PL/SQL.

INTERNSHIP OR PRACTICAL (2 - CREDITS)

Note: *The Practical Component shall be based on the Unit-I to Unit-IV*

LAB WORK ON DBMS:

EXERCISES:

1. Installation and configuration of appropriate DBMS software.
2. Usage of DDL commands: Create, alter, drop, rename and truncate commands.
3. Usage of DML commands: insert, update, delete, select etc.
4. Create a relational database for a library system that includes tables for books, authors, publishers, and borrowers.
5. Design an ER diagram for a university system that includes tables for students, courses, instructors, and departments.
6. Studying and creating triggers in RDBMS.
7. Implementing PL/SQL functions with control structures, procedures and functions.

REFERENCES:

1. Date, C. J.”An Introduction to Database System”, Narosa publications house, n. Delhi
2. Elmasri and Navathe,”Fundamentals of Database System”, Addison Wesley, N.Y.
3. BipinDesai,”An Introduction to Database Concepts”, Galgotia publications, N. Delhi

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – III)

5th SEMESTER

BIT522J3: INFORMATION TECHNOLOGY _ DATA STRUCTURES USING C

CREDITS: THEORY-04; TUTORIAL-02

THEORY (4 CREDITS)

UNIT-I: INTRODUCTION TO DATA STRUCTURES

CONCEPT OF STRUCTURED DATA:

Data and Information, Data Structure, Classification of Data Structure, Primitive Data Types, Operations on Data Structure, Control structures

ARRAYS: Introduction, representation of 1D & 2D array

Operations on arrays: Searching, traversal, insertion, deletion.

UNIT-II: SORTING AND SEARCHING ALGORITHMS

SEARCHING:

Linear search, Binary search,

SORTING:

Bubble Sort, Insertion Sort, Selection Sort, Quick sort and Merge sort

UNIT-III STACKS QUEUES AND LINKED LISTS

Stack: Introduction, Operations on the Stack Memory Representation of Stack, Array implementation of Stack, Applications of Stack

Queue: Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array implementation of queue, Circular Queue, Some special kinds of queues, Deque, Priority Queue, Applications of Queues.

LINKED LISTS: Introduction to Linked List, Allocation and De-allocation, Traversing a linked list, Insertion in Linked List, Deletion from Linked List, Circular Linked List, Doubly Linked List, Traversing a doubly-linked list, insertion and deletion from doubly linked list.

UNIT-IV TREES

TREES: Basic Terminology: Representation of Binary Trees, Binary Search Trees, Traverse a binary tree (pre-order, In-order and Post-order) , searching, insertion and deletion in binary search tree.

GRAPHS: Introduction to graphs, BFS and DFS algorithms.

PRACTICAL (2- CREDITS)

NOTE: THE PRACTICAL COMPONENT SHALL BE BASED ON THE UNIT-I TO UNIT-IV

RECOMMENDED BOOKS:

- 1: Data Structures Using C by E Balagurusamy, Tata McGraw Hill, India
2. Yashwant Kanitkar “Understanding pointers in C”
3. Aaron M .Tenenbaum by Data Structure using C and C ++
4. “Fundamentals of Data Structures by Ellis Horowitz and Sartaj Sahni, Galgotia Publications.
5. Data Structures by Seymour Lipschutz, MCGraw Hill Education

BACHELOR WITH APPLIED COMPUTING AS MINOR

5th SEMESTER

(FOR STUDENTS WITH MAJOR IN COMPUTER APPLICATIONS / INFORMATION TECHNOLOGY)

ACP522N: APPLIED COMPUTING _ THEORY OF COMPUTATION

CREDITS: THEORY (3) PRACTICAL (1)

MAX. MARKS: 100 MIN. MARKS: 36

COURSE LEARNING OUTCOMES:

Upon completion of this course, students will be able to:

- 1. Understand the basic concepts of complexity theory, computability theory, and automata theory.*
- 2. Apply different types of proof techniques, such as proof by construction, proof by contradiction, and proof by induction.*
- 3. Design and analyze finite automata and regular expressions to recognize and generate regular languages.*
- 4. Design and analyze pushdown automata and context-free grammars to recognize and generate context-free languages.*
- 5. Understand the Church-Turing thesis and its implications for computability.*
- 6. Define and analyze polynomial-time and NP problems.*
- 7. Understand the P vs NP problem and its implications for complexity theory.*

THEORY (3 CREDITS)

UNIT 1:

Introduction to Automata Theory: Automata and Languages. Regular Languages: Finite Automata (formal definition of computation, designing finite automata, the regular operations).

Deterministic and non-deterministic automata, formal definition of NFA, equivalence of NFAs and DFAs. Closure under the regular operations.

Regular Expressions: Formal definition, equivalence with finite automata.

UNIT 2:

Introduction to Grammar and its hierarchy. Context Free Languages: Formal definition, examples, designing of CFGs, Ambiguity. Pushdown Automata: Formal definition, equivalence with CFGs.

Non-Context Free Languages. Deterministic Context-Free Languages: properties, Deterministic context-free grammars, relationship of DPDAs and DCFGs.

Recursive and Recursively enumerable languages.

UNIT 3:

Computability Theory. The Church-Turing Thesis: Turing Machines (formal definition, examples). Introduction to Decidability, Reducibility, Recursion Theorem. Introduction to Undecidability: Halting problem.

Complexity Theory. Time Complexity: Asymptotic notations, Class P (polynomial time, examples), The class NP, P vs NP, NP-completeness. Introduction to Space complexity.

TUTORIAL (1 CREDIT):

Examples and problems based on Unit 1st to 3rd as specified by the course teacher.

TEXT BOOK:

1. Introduction to the Theory of Computation, Third Edition Michael Sipser, Cengage Learning, ISBN-13: 978-1-133-18779-0

REFERENCE BOOK

1. Padma Reddy
2. Introduction to Automata Theory, Languages, and Computation by Jeffrey D. Hopcroft, John E. Hopcroft, and Jeffrey D. Ullman (3rd edition, 2006)
3. Formal Languages and Automata Theory by Peter Linz (3rd edition, 2011)

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – I)
6th SEMESTER

BIT622J1 INFORMATION TECHNOLOGY _ SYSTEM ANALYSIS AND DESIGN

CREDITS: THEORY-03; TUTORIAL-01

THEORY (3 CREDITS)

UNIT I

Basic Concept of Systems: The System: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems - Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories.

Information System and System Analyst: Information systems: TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst, System Analyst as an agent of change.

UNIT II

System Development Life Cycle: Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.

System Planning and Information Gathering: Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits.

Feasibility Study: Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.

UNIT III

Tools for System Analysis: Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables.

System Design: Module specifications, Module Coupling and cohesion, Top-down and bottom-up design; Logical and Physical design, Structured design.

Input and Output Input design: Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design.

System Implementation and Maintenance: Need for System Testing, Types of System Testing, Quality Assurance; System Conversion, Conversion methods, procedures and controls, System evaluation and performance, Maintenance activities and issues.

TUTORIAL (1- CREDIT)

Note: The Practical Component shall be based on the Unit-I to Unit-III

RECOMMENDED BOOKS:

- Elias m. Awad: System Analysis and Design
- Perry Edwards: System Analysis & design Mc Graw Hill
- “Fundamentals of Data Structures by Ellis Horowitz and Sartaj Sahni, Galgotia Publications.

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – II)
6th SEMESTER

BIT622J2 INFORMATION TECHNOLOGY _ CORE JAVA PROGRAMMING

CREDITS: THEORY-04; PRACTICAL-02

THEORY (4 CREDITS)

UNIT I

Introduction: JAVA Evolution, Introduction to Programming Languages, The Evolution of Java, Object-Oriented Programming Concepts and Java, The Primary Characteristics of Java, The Architecture, Simple Java Program, More of Java, An Application with Two Classes Java Program structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Programming Style.

Branching: Constants, Variables, and Using Data Types, Operators and Expressions, Type conversion. Decision Making and Introduction, Decision Making with if Statement, Simple if Statement, if else Statement, Nesting of if ... else Statements, The else if Ladder, The Switch Statement, The?: Operator. **Decision Making and Looping:** Introduction. while Statement, do Statement, for Statement.

UNIT II

Introduction: defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods.

Inheritance: Extending Class Overriding Methods, Final Variables and Methods, Finalized methods, Abstract Methods and Classes, Visibility Control, Multiple Inheritance. **Arrays Strings and Vectors:** Arrays, One – dimensional Arrays, Creating an Array, Two – dimensional Arrays, Strings, Vectors and Wrapper Classes.

UNIT III

Interfaces: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Introduction to Java Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes.

UNIT IV

Multithreading - Introduction: Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

PRACTICAL (2- CREDITS)

Note: The Practical Component shall be based on the Unit-I to Unit-IV

REFERENCES:

- “Introduction to Java Programming” by Daniel Liang.
- E. Balaguruswamy, Programming with JAVA, A Primer, TMH (1999)

BACHELORS WITH INFORMATION TECHNOLOGY AS MAJOR (CT – III)
6th SEMESTER

BIT622J3 INFORMATION TECHNOLOGY _ CYBER SECURITY

CREDITS: THEORY-04; TUTORIA-02

THEORY (4 CREDITS)

UNIT I

Overview of Cyber Security: Definition of Cyber Security and its importance in the modern digital landscape.

Evolution of Cyber Threats: Historical perspective on cyber-attacks and their impact on individuals, organizations, and governments.

Cyber Security Frameworks: Introduction to NIST Cybersecurity Framework, ISO/IEC 27001, and other relevant standards.

UNIT II

Cyber Threats and Attack: Cyber Threats and Attack Vectors, Types of Cyber Threat Actors: State-sponsored attackers, hacktivists, cybercriminals, and insider threats. Common Cyber Attack Vectors: Phishing, malware, ransomware, DDoS (Distributed Denial of Service), and social engineering.

Case Study: WannaCry Ransomware (2017).

UNIT III

Introduction to Cryptography: Encryption Basics: Symmetric and asymmetric encryption algorithms and their applications. Hashing: Understanding cryptographic hash functions and their role in data integrity. Public Key Infrastructure (PKI).

Cyber Defense and Risk Management: Cyber Defense Strategies,

Firewalls and Intrusion Detection/Prevention Systems (IDS/IPS): Technologies to monitor and prevent unauthorized access. Antivirus and Endpoint Protection: Protecting individual devices from malware and cyber threats.

Case Study: SolarWinds Supply Chain Attack (2020).

UNIT IV

Cyber Defense and Risk Management: Cyber Defense Strategies, Firewalls and Intrusion Detection/Prevention Systems (IDS/IPS): Technologies to monitor and prevent unauthorized access. Antivirus and Endpoint Protection: Protecting individual devices from malware and cyber threats. Incident Response and Handling: Incident Detection and Analysis: Identifying and analyzing security incidents promptly. Incident Response Plan: Developing a structured approach to respond to cyber incidents. Risk Assessment and Management: Risk Analysis: Identifying potential threats, vulnerabilities, and potential impact on an organization.

Case Study: Colonial Pipeline Ransomware Attack (2021).

TUTORIAL (2- CREDITS)

Note: The Tutorial Component shall be based on the Unit-I to Unit-IV

REFERENCES:

- Allan Friedman and P. W. Singer, Cyber Security and Cyber war: What Everyone Needs to Know by Published Oxford University
- Don Franke, Cyber Security Basics: Protect Your Organization by Applying the Fundamentals by Publisher CreateSpace Independent Publishing Platform, 2016
- "Cybersecurity - Attack and Defense Strategies" by Yuri Diogenes and Erdal Ozkaya, Publication House: Packt Publishing, 2018, Edition: 1st Edition.
- Introduction to Cybersecurity: Stay Safe Online" by Tim Patrick, Apress 1st Edition, 2017

**BACHELOR WITH APPLIED COMPUTING AS MINOR
SIXTH SEMESTER**

(FOR STUDENTS WITH MAJOR IN COMPUTER APPLICATIONS / INFORMATION TECHNOLOGY)

ACP622N: APPLIED COMPUTING _ ARTIFICIAL INTELLIGENCE

CREDITS: THEORY (3) PRACTICAL (1)

MAX. MARKS: 100 MIN. MARKS: 36

COURSE LEARNING OUTCOMES:

1. Study the concepts of Artificial Intelligence.
2. Learn the methods of solving problems using Artificial Intelligence.
3. Learn the knowledge representation techniques, reasoning techniques and planning.

THEORY (3 CREDITS)

PREREQUISITE: Data Structures and Analysis of Algorithm

UNIT 1: AI AND TURING TEST: (15 LECTURES)

Introduction to Artificial Intelligence, Background and Applications, Turing Test, Rational Agent approaches to AI, Introduction to Intelligent Agents, structure, behaviour and environment.

UNIT 2: SEARCHING PROBLEM SPACE: (15 LECTURES)

Problem Characteristics, Production Systems, Informed vs Uninformed Strategies, Hill Climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm.

The Wumpus World Environment, Acting and reasoning in the Wumpus world, Representation, Reasoning, Logic, Propositional Logic and First-Order Logic, Rules of Inferencing: Resolution Principle.

UNIT 3: UNCERTAIN KNOWLEDGE AND REASONING: (15 LECTURES)

Acting under Uncertainty, handling uncertain knowledge, Uncertainty and rational decisions, Basic Probability Notation, Prior probability, Conditional probability, joint probability distribution, Bayes' Rule and Its Use, Applying Bayes' rule: The simple case, Normalization, Dampster's Shafer's Theorem.

TUTORIAL (1 CREDIT):

1. Given a real life situation
 - identify the characteristics of the environment
 - identify the percepts available to the agent
 - identify the actions that the agent can execute
 - suggest the performance measures to evaluate the agent
 - recommend the architecture of the desired intelligent agent
2. Undertake a comparative study on popular programming languages used in AI.
3. Translate commonly used English sentences into their equivalent logical expressions.
4. Given a problem description, formulate it in terms of a state space search problem. Analyze the given problem and identify the most suitable search strategy for the problem. Make an analysis of the properties of proposed algorithms in terms of
 - time complexity
 - space complexity
 - optimality
5. Write a Program to Implement Breadth First Search.
6. Write a Program to Implement Depth First Search.
7. Write a program to implement Hill Climbing Algorithm
8. Write a program to implement A* Algorithm.
9. Write a program to implement Tic-Tac-Toe game.
10. Write a Program to Implement 8-Puzzle problem.
11. Write a Program to Implement Water-Jug problem.
12. Write a Program to Implement Alpha-Beta Pruning using Python.
13. Write a Program to Implement 8-Queens Problem.
14. Build a Fuzzy inference system for the Tipping Problem.
Given two sets of numbers between 0 and 5 (where 0 is for very poor, and 5 for excellent) that respectively represent quality of service and quality of food at restaurant, what should tip be?
15. Solve 2-input 1-output project risk prediction problem using Mamdani Inference. Make necessary assumptions.

TEXT BOOK:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems - PHI, 2007.

REFERENCES:

1. Russell & Norvig. Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition. 2005.
2. Ivan Bratko, "Prolog Programming for Artificial Intelligence", 3rd Edition, Pearson Education.
3. Rich & Knight, Artificial Intelligence - Tata McGraw Hill. 2nd edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.