

FYUGP CURRICULAR FRAMEWORK FOR BACHELORS PROGRAMME WITH INFORMATION TECHNOLOGY AS MAJOR

| SEMESTER | COURSE CODE | TYPE OF COURSE | TITLE OF COURSE | CREDITS | |
|----------------------------------------|-------------|----------------|------------------------------------------------------------------------------------|---------|----------------------|
| | | | | THEORY | PRACTICAL / TUTORIAL |
| I | BIT122J | CT-1 | INFORMATION TECHNOLOGY: BASIC COMPUTING | 4 | 2 |
| II | BIT222J | CT-1 | INFORMATION TECHNOLOGY: COMPUTER ARCHITECTURE AND ORGANISATION | 4 | 2 |
| III | BIT322J | CT-1 | INFORMATION TECHNOLOGY: C PROGRAMMING | 4 | 2 |
| IV | BIT422J1 | CT-1 | INFORMATION TECHNOLOGY: OOPS USING C++ | 3 | 1 |
| | BIT422J2 | CT-2 | INFORMATION TECHNOLOGY: OPERATING SYSTEMS | 4 | 2 |
| | BIT422J3 | CT-3 | INFORMATION TECHNOLOGY: SOFTWARE ENGINEERING | 4 | 2 |
| V | BIT522J1 | CT-1 | INFORMATION TECHNOLOGY: DOT NET | 3 | 1 |
| | BIT522J2 | CT-2 | INFORMATION TECHNOLOGY: DATABASE MANAGEMENT SYSTEM | 4 | 2 |
| | BIT522J3 | CT-3 | INFORMATION TECHNOLOGY: DATA STRUCTURES USING 'C' | 4 | 2 |
| VI | BIT622J1 | CT-1 | INFORMATION TECHNOLOGY: SYSEM ANALYSIS AND DESIGN | 3 | 1 |
| | BIT622J2 | CT-2 | INFORMATION TECHNOLOGY: CORE JAVA PROGRAMMING | 4 | 2 |
| | BIT622J3 | CT-3 | INFORMATION TECHNOLOGY: CYBER SECURITY | 4 | 2 |
| FOR FYUGP HONOURS | | | | | |
| VII | BIT722J1 | CT-1 | INFORMATION TECHNOLOGY: MOBILE COMPUTING | 3 | 1 |
| | BIT722J2 | CT-2 | INFORMATION TECHNOLOGY: DATA COMMUNICATIONS AND NETWORKS | 4 | 2 |
| | BIT722J3 | CT-3 | INFORMATION TECHNOLOGY: PYTHON PROGRAMMING | 4 | 2 |
| VIII | BIT822J1 | CT-1 | INFORMATION TECHNOLOGY: MACHINE LEARNING | 3 | 1 |
| | BIT822J2 | CT-2 | INFORMATION TECHNOLOGY: COMPUTER GRAPHICS | 4 | 2 |
| | BIT822J3 | CT-3 | INFORMATION TECHNOLOGY: MICROPROCESSOR | 4 | 2 |
| FOR FYUGP HONOURS WITH RESEARCH | | | | | |
| VII | BIT722J1 | CT-1 | INFORMATION TECHNOLOGY: INTRODUCTION TO INNOVATION AND ENTREPRENEURSHIP TECHNOLOGY | 3 | 1 |
| | BIT722J2 | CT-2 | INFORMATION TECHNOLOGY: DATA COMMUNICATIONS AND NETWORKS | 4 | 2 |
| | BIT722J3 | CT-3 | INFORMATION TECHNOLOGY: PYTHON PROGRAMMING | 4 | 2 |
| VIII | BIT822J1 | CT-1 | INFORMATION TECHNOLOGY: MACHINE LEARNING | 3 | 1 |
| | BIT822JP | PROJECT | INFORMATION TECHNOLOGY: PROJECT WITH DISSERTATION | - | 12 |

FYUGP CURRICULAR FRAMEWORK FOR BACHELORS PROGRAMME WITH INFORMATION TECHNOLOGY AS MINOR

| SEMESTER | COURSE CODE | TYPE OF COURSE | TITLE OF COURSE | CREDITS | |
|----------|-------------|----------------|----------------------------------------------------------------|---------|----------------------|
| | | | | THEORY | PRACTICAL / TUTORIAL |
| I | BIT122N | CT-1 | INFORMATION TECHNOLOGY: BASIC COMPUTING | 4 | 2 |
| II | BIT222N | CT-1 | INFORMATION TECHNOLOGY: COMPUTER ARCHITECTURE AND ORGANISATION | 4 | 2 |
| III | BIT322N | 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: SYSEM 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 |

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

| SEMESTER | COURSE CODE | TYPE OF COURSE | TITLE OF COURSE | CREDITS | |
|----------|-------------|----------------|------------------------------------------------------------|---------|----------------------|
| | | | | THEORY | PRACTICAL / TUTORIAL |
| I | AIT122N | CT-1 | INFORMATION TECHNOLOGY: DIGITAL ELECTRONICS | 4 | 2 |
| II | AIT222N | CT-1 | INFORMATION TECHNOLOGY: OPEN-SOURCE TOOLS AND TECHNOLOGIES | 4 | 2 |
| III | AIT322N | CT-1 | INFORMATION TECHNOLOGY: CLOUD COMPUTING | 4 | 2 |
| IV | AIT422N | CT-1 | COMPUTER APPLICATIONS: IOT FUNDAMENTALS | 3 | 1 |
| V | AIT522N | CT-1 | INFORMATION TECHNOLOGY: DESIGN ANALYSIS AND ALGORITHM | 3 | 1 |
| VI | AIT622N | CT-1 | INFORMATION TECHNOLOGY: DATA MINING | 3 | 1 |
| VII | AIT722N | CT-1 | INFORMATION TECHNOLOGY: ARTIFICIAL INTELLIGENCE | 3 | 1 |
| VIII | AIT822N | CT-1 | COMPUTER APPLICATIONS: LATEX | 3 | 1 |

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DIRECTORATE OF IT&SS / CONVENOR BOUGS

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| CT-1: 1st Semester | | | | | | |
|--------------------------------------|--------------------|-------------------|-----------------|------------------|------------------------|-----------------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Tutorial |
| Basic Computing | BIT122J | 04 | 02 | Nil | 60 | 30 |

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. IntroductiontoInformationTechnology,VRajaraman,PHI
2. IntroductiontoComputers, PeterNorton, 7thEdition, McGrawHillEducation
3. FundamentalsofComputers, V.Rajaraman, PHIPublications
4. ComputerFundamentals,AnitaGoel,PearsonEducationIndia

| CT-1: 1 st Semester | | | | | | |
|--------------------------------|-------------|------------|----------|-----------|-----------------|-----------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| Digital Electronics | AIT122N | 04 | Nil | 02 | 60 | 30 |

UNIT I:

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

Binary Arithmetic: Binary Addition, Decimal Subtraction Using 9's and 10's Compliment, Binary Subtraction Using 1's and 2's Compliment, 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*

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 McGraw

| CT-1: 2 nd Semester | | | | | | |
|----------------------------------------|-------------|------------|----------|-----------|-----------------|----------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Tutorial |
| Computer Architecture and Organization | BIT222J | 04 | 02 | Nil | 60 | 30 |

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", McGrawHill

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

| CT-1: 2nd Semester | | | | | | |
|--------------------------------------|--------------------|-------------------|-----------------|------------------|------------------------|------------------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| Open-Source Tools and Technologies | AIT222N | 04 | Nil | 02 | 60 | 30 |

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.

Practical: (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

| CT-1: 3rd Semester | | | | | | |
|--------------------|-------------|------------|----------|-----------|-----------------|-----------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| C-Programming | BIT322J | 04 | Nil | 02 | 60 | 30 |

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)

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

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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 Bryan Gottfried, Tata McGraw Hill

| CT-1: 3rd Semester | | | | | | |
|--------------------|-------------|------------|----------|-----------|-----------------|----------|
| Course Title | Course Code | Credits-06 | | | Total Marks- 90 | |
| | | Theory | Tutorial | Practical | Theory | Tutorial |
| Cloud Computing | AIT322N | 04 | 02 | Nil | 60 | 30 |

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-I*

References:

1. Essentials of Cloud Computing, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2]
2. Raj Kumar Buyya, James Broberg and rezeiM.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]

| CT-1: 4 th Semester | | | | | | |
|--------------------------------|-------------|----------|----------|-----------|--------------|-----------|
| Course Title | Course Code | Credits- | | | Total Marks- | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| OOPS Using C++ | BIT422J1 | 03 | Nil | 01 | 45 | 15 |

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
“Object oriented programming in C++” by Robert Lafore

| CT-2: 4 th Semester | | | | | | |
|--------------------------------|-------------|----------|----------|-----------|--------------|-----------|
| Course Title | Course Code | Credits- | | | Total Marks- | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| Operating Systems | BIT422J2 | 04 | 02 | Nil | 60 | 30 |

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

| CT-3: 4 th Semester | | | | | | |
|--------------------------------|-------------|----------|----------|-----------|--------------|-----------|
| Course Title | Course Code | Credits- | | | Total Marks- | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| Software Engineering | BIT422J3 | 04 | 02 | Nil | 60 | 30 |

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

| CT-1: 4 th Semester | | | | | | |
|--------------------------------|-------------|----------|----------|-----------|--------------|-----------|
| Course Title | Course Code | Credits- | | | Total Marks- | |
| | | Theory | Tutorial | Practical | Theory | Practical |
| IOT Fundamentals | AIT422N | 03 | 01 | Nil | 45 | 15 |

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:

"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

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

"Internet of Things: Principles and Paradigms" by Rajkumar Buyya, Amir Vahid Dastjerdi

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|--------------------------------------------------------------------|-----------------------------|-------------------------|---------------------|
| Course Title: Information Technology (Dot Net Technologies) | | Total Credits-04 | |
| | | Theory-03 | Practical-01 |
| | | Total Marks- | |
| Course Code: BITS22J1 | Type of Course: CT-1 | Theory: | Practical: |

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:

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

| | | | |
|--------------------------------------------------------------------------|--|-----------------------------|---------------------|
| Course Title: Information Technology (Database Management System) | | Total Credits-06 | |
| | | Theory-04 | Practical-02 |
| Course Code: BIT522J2 | | Type of Course: CT-2 | |
| | | Theory | Practical |

Unit I

Introduction: Introductory concepts of Databases, Traditional File processing system and its drawbacks, purpose and evolution of database 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.

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.

Reference Books:

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

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|-----------------------------------------------------------------------|--|-----------------------------|---------------------|
| Course Title: Information Technology (Data structures using C) | | Total Credits-06 | |
| | | Theory-04 | Practical-02 |
| Course Code: BIT522J3 | | Type of Course: CT-3 | |
| | | Theory | Practical |

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 and Graphs

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

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|--------------------------------------------------------------------------|-----------------------------|-------------------------|--------------------|
| Course Title: Information Technology (System Analysis and Design) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: BIT622J1 | Type of Course: CT-1 | Total Marks- | |
| | | Theory | Tutorial |

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 tutorial Component shall be based on the Unit-I to Unit-III

Recommended Books:

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

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|---------------------------------------------------------------------|--|-----------------------------|---------------------|
| Course Title: Information Technology (Core Java programming) | | Total Credits-06 | |
| | | Theory-04 | Practical-02 |
| Course Code: BIT622J2 | | Type of Course: CT-2 | |
| | | Theory | Practical |

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:

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

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|--------------------------------------------------------------|-----------------------------|-------------------------|--------------------|
| Course Title: Information Technology (Cyber Security) | | Total Credits-06 | |
| | | Theory-04 | Tutorial-02 |
| | | Total Marks- | |
| Course Code: BIT622J3 | Type of Course: CT-3 | Theory | Tutorial |

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:

1. Allan Friedman and P. W. Singer, Cyber Security and Cyber war: What Everyone Needs to Know by Published Oxford University

2. Don Franke, Cyber Security Basics: Protect Your Organization by Applying the Fundamentals by Publisher CreateSpace Independent Publishing Platform, 2016
3. Cybersecurity - Attack and Defense Strategies" by Yuri Diogenes and Erdal Ozkaya, Publication House: Packt Publishing, 2018, Edition: 1st Edition.
4. Introduction to Cybersecurity: Stay Safe Online" by Tim Patrick, Apress 1st Edition, 2017

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|---------------------------------------------------------|--|----------------------|-------------|
| Course Title: Information Technology (Mobile Computing) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: BIT722J1 | | Type of Course: CT-1 | |
| | | Theory | Tutorial |

Unit I

Introduction of Mobile Computing: History, Types, Benefits, Application, Evolution, Security Concern regarding Mobile Computing, Different Propagation Modes, Wireless Architecture and its types, needs of mobile user.

The cellular concept: Cellular system, hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio.

Unit II

Telecommunication System: GSM: - Channel allocation, call routing Architecture, PLMN interface, addresses and identifiers, network aspects, frequency allocation, authentication and security, Handoffs Technique. GPRS: network operation, data services, Applications, Billing and charging.

Mobile IP: Need of mobile IP, IP packet delivery, Agent Discovery, Registration, Tunnelling and encapsulation, Route optimization, IP Handoff.

Mobile Transport Layer: Overview of Traditional TCP and implications of mobility control. Improvement of TCP: Indirect TCP, Snoop TCP, Mobile TCP, Fast Retransmit/fast recovery, Time-out freezing, Selective retransmission, Transaction-oriented TCP.

Unit III

Wireless Application Protocol: Introduction of WAP, WAP applications, WAP Architecture, WAP Protocol Stack, Challenges in WAP.

Mobile Ad Hoc wireless networks: Introduction, Benefits, Difference, Routing protocols for ad hoc wireless networks: DSDV and AODV.

Introduction to 4G: Introduction, features and challenges, Applications of 4G, 4G network architecture

Tutorial (1- Credit)

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

References:

1. Mobile Computing Technology, Applications and service creation, Asoke K Telukder, Roopa R Yavagal by TMH.
2. Mobile Computing, Raj Kamal by Oxford
3. Wireless Communications & Networks, Second Edition, William Stallings by Pearson
4. Mobile Computing Theory and Practice-Kumkum Garg-Pearson
5. TCP/IP Protocol Suite by Behrouz A Forouzan, Third Edition, TMH

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|--------------------------------------------------------------------------------|-----------------------------|-------------------------|--------------------|
| Course Title: Information Technology (Data Communications and Networks) | | Total Credits-06 | |
| | | Theory-04 | Tutorial-02 |
| Course Code: BIT722J2 | Type of Course: CT-2 | Total Marks- | |
| | | Theory | Tutorial |

Unit I

Data communication concepts: Introduction to data communication, Data communication modes (simplex, half-duplex, full duplex). Classification of Networks: LAN, MAN, & WAN, Network Topologies: (Mesh, Star, Bus, and Ring topologies). Network standards & Protocols: OSI Reference Model, TCP/IP Model and their Comparison.

Unit II

Characteristics of signals: (Amplitude, frequency, period, wavelength, S/N ratio), bandwidth & channel capacity, Nyquist law for noiseless channel and Shannon's, law for noisy channel, data rate v/s baud rate. Transmission impairments, Performance.

Line Coding, Line coding schemes, Analog to Digital conversion, Digital to analog conversion.

Unit III

Data communication media: Guided transmission media- twisted pair cable, coaxial cable, optical fiber cable. Unguided transmission media (wireless) - radio waves, infrared waves.

Media access control: Random Access, Controlled access.

Unit IV

Switching Techniques: Circuit Switching, Message Switching & Packet Switching, Multiplexing

Error Detection and Correction: Block code, Cyclic Redundancy check, Forward error correction

Tutorial (2- Credits)

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

References:

1. "Data and Computer Communications" by William Stalling.
2. "Data Communication & Networking" by Behrouz A Forouzan.
3. "Computer Networks" by Andrew Tanenbaum.
4. "Data communications and networks" by Godbole

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|------------------------------------------------------------------|--|-----------------------------|---------------------|
| Course Title: Information Technology (Python Programming) | | Total Credits-06 | |
| | | Theory-04 | Practical-02 |
| Course Code: BIT722J3 | | Type of Course: CT-3 | |
| | | Theory | Practical |

Unit I

Introduction to Python: Introduction to Python and installation, Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float, string, Boolean.

Unit II

Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, for loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

Unit III

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, organizing python codes using functions.

Unit IV

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Database Programming: Connecting to a MYSQL database, Creating Tables, INSERT, UPDATE, DELETE and READ operations.

Practical (2- Credits)

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

References:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, 2nd edition,
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Core Python Programming, W.Chun, Pearson.
4. Introduction to Python, Kenneth A. Lambert, Cengage
5. Learning Python, Mark Lutz, Orielly

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|----------------------------------------------------------------|--|-------------------------|--------------------|
| Course Title: Information Technology (Machine Learning) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: BIT822J1 | | Total Marks- | |
| | | Theory | Tutorial |
| Type of Course: CT-1 | | | |

Unit I

Machine Learning Overview: Definition, History of Machine Learning, Types of Machine Learning: Supervised Learning, Unsupervised Learning, Semi-supervised Learning, Reinforcement Learning. Data Pre-processing Techniques:- Importance of Data Pre-processing, Techniques for Data Cleaning and Transformation, Handling Missing Data.

Unit II

Supervised Learning Algorithms: Classification Algorithms, Definition and Purpose, Examples and Applications, Decision Trees, Linear Regression, **Unsupervised Learning and Applications:** Clustering Algorithms, Definition and Purpose, K-Means Clustering.

Evaluation Metrics: Accuracy: Definition and calculation of accuracy. Interpretation in the context of classification models. Precision and Recall: Understanding precision and recall as metrics for classification models. Mean Squared Error (MSE): Calculation and interpretation of mean squared error. Confusion Matrix: Construction and interpretation of a confusion matrix. ROC Curve and AUC.

Unit III

Introduction to Neural Networks: Overview of neural networks and their inspiration from the human brain. Neurons, synapses, and the basic structure of artificial neural networks. **Perceptron:** Definition and concept of a perceptron. Single-layer perceptron and its limitations. Multilayer Perceptron. Applications of Machine Learning and Neural Networks.

Tutorial (1- Credit)

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

References:

1. "Introduction to Machine Learning" by N. S. Sreenivasulu and B. Yegnanarayana (Prentice-Hall of India, 2018).
2. "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" by K. Venkat Reddy (McGraw-Hill Education, 2018).
3. Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy (MIT Press, 2012).
4. "Neural Networks: A Comprehensive Foundation" by Simon O. Haykin (Pearson Education India, 2008)

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|-----------------------------------------------------------------|-----------------------------|-------------------------|--------------------|
| Course Title: Information Technology (Computer Graphics) | | Total Credits-06 | |
| | | Theory-04 | Tutorial-02 |
| | | Total Marks- | |
| Course Code: BIT822J2 | Type of Course: CT-2 | Theory | Tutorial |

Unit I

Introduction to computer graphics. Video Display Devices- Cathode ray tube, Raster scan displays, Random scan displays. Raster scan systems, Random scan systems, Input devices, Two-dimension Coordinate Representations, Fundamental problems in Geometry.

Unit II

Algorithms: Line drawing-DDA, Bresenham's, Circle and Ellipse generating algorithms- Midpoint Circle Algorithm, Midpoint Ellipse Algorithm.

Unit III

Area Filling: Filled Area Primitives, Scan-Line Polygon Fill Algorithm, Inside-Outside Tests, Scan-Line Fill of Curved Boundary Areas, Boundary- Fill Algorithm, Flood-Fill Algorithm, Character Generation, Attributes of lines, curves, filling, characters etc.

Unit IV

2-D Geometric Transformations: Basic Transformations, Matrix representation Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations between Coordinate Systems, Raster methods for Transformations.

Tutorial (2- Credits)

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

References:

1. Computer Graphics, Donald Hearn & M. Pauline Baker, PHI
2. Computer Graphics by Hill Jr
3. Computer Graphics, Steven Harrington, McGraw-Hill

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|--------------------------------------------------------------|--|-------------------------|--------------------|
| Course Title: Information Technology (Microprocessor) | | Total Credits-06 | |
| | | Theory-04 | Tutorial-02 |
| Course Code: BIT822J3 Type of Course: CT-3 | | Total Marks- | |
| | | Theory | Tutorial |

Unit I

Microprocessor: Basic Concepts, what is a Microprocessor. Evolution of Microprocessor, Microprocessor Programming. Instructions, Machine and Mnemonic Codes. Machine and Assembly Language Programming, High Level Language Programming.

Unit II

Data Representations: Introduction - Representation of integers (Positive Integers, Maximum Integer, Negative Number Representation, Minimum Integer, BCD Representation), Representation of Real Numbers (Conversion of Real Number, Floating Point Notation, Representation of Floating Point Number, Accuracy and Range in Floating point Representation); Binary Arithmetic (addition and Subtraction of Binary Integers, Overflow and Underflow, Addition of Floating point Number); Other Number System (Some Conventions), Character Representation.

Unit III

8085 Microprocessor Architecture. Programming: Introduction - Organization of the 8085, Data and Address Busses, Addressing modes, Registers in the 8085, Pin Diagram of 8085 microprocessor. Instruction Set (Instructions Addressing Modes, Space and time Requirements). Addressing I /O Devices Basic programs in 8085, Stacks Subroutines.

Unit IV

Microprocessor timings: Introduction - timing and control unit (Basic Concepts, The Fetch operation, The Execute Cycle, Machine Cycle and state, instruction and data flow. **Timing of 8085:** 8085 buses, Opcode fetch cycle, Memory and I/O read cycles, Memory Acknowledgement Read Cycles, Memory and I/O Write Cycles, Interrupt Timings, Interrupt Acknowledgement Machine Cycle, vectored and non-vectored interrupts, Bus Idle Machine Cycle, The HALT and HOLD States.

Tutorial (2- Credits)

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

References:

1. R. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, Penram.
2. Pal, Microprocessors: Principles and Applications, Tata McGraw-Hill.

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|----------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------|--------------------|
| Course Title: Information Technology (Introduction to Innovation and Entrepreneurship Technology) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: BIT722J1 | Type of Course: CT-1 | Total Marks- | |
| | | Theory | Tutorial |

Unit I

Introduction to Innovation and Entrepreneurship: Definition of innovation and entrepreneurship. Importance of innovation in technology, The Innovation Process. Idea generation and identification. Feasibility analysis and validation. Creativity and Design Thinking. Techniques for fostering creativity. Introduction to design thinking.

Unit II

Technology Trends and Disruption: Emerging technologies and their impact. Case studies of disruptive innovations. Entrepreneurial Mindset. Characteristics of successful entrepreneurs. Overcoming challenges in entrepreneurship. Business Models for Technology Startups. Types of business models in IT. Lean startup methodology.

Unit III

Technology Commercialization. Bringing innovations to market. Marketing and sales strategies for tech products Legal and Ethical Considerations. Intellectual property rights. Ethical implications of technology innovation. Startup economics, Market consideration for startups.

Tutorial (1- Credit)

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

Reference Books:

1. Entrepreneurship –by Robert D. Hisrich (Edition-9)
2. Innovation and Entrepreneurship – by Peter Drucker, Harper Collins
3. Technology Entrepreneurship Taking Innovation to the Marketplace – by Thomas N. Duening, Robert D. Hisrich and Michael A. Lechter, Elsevier

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|-----------------------------------------------------------------------------|--|-----------------------------|--------------------|
| Course Title: Information Technology (Design Analysis and Algorithm) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: AIT522N | | Type of Course: CT-1 | |
| | | Theory | Tutorial |

Unit I

Introduction to Algorithms, Analysis of algorithms, Designing Algorithms, Growth of Functions, Asymptotic notations, Recurrences, Substitution method, Iteration method, Recursion trees, Master Method.

Unit II

Divide and Conquer, General method, Binary search, Quick sort, Merge Sort. Greedy Method, General method, Graphs: Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), 0-1 Knapsack problem Dynamic programming, General methods, All pair shortest path. Backtracking, General method, 8-Queen problem, Sum of subsets, Knapsack problem. Branch and Bound, General method, Least Cost Branch and Bound.

Unit III

Graph Algorithms: An introduction using graphs and games Traversing Trees– Preconditioning, Depth First Search (DFS), Undirected Graph, Directed Graph Lower boundary theory, Lower bound theory through reductions, P and NP problems. NP hard and NP complete problems.

Tutorial (1- Credit)

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

Textbook:

1. Pearson Horowitz, Sahni, "Fundamentals of Computer Algorithms", Galgotia Publications
2. Goodrich and Tamassia, "Algorithm design"

Reference Books:

1. Coremen, Leiserson, Rivest, Stein, "Introduction to Algorithms", 2nd edition, PHI.
2. Aho, Hopcroft and Ullman, "The Design and Analysis of Computer Algorithms", Pearson.

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|-----------------------------------------------------------|--|-------------------------|--------------------|
| Course Title: Information Technology (Data Mining) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: AIT622N | | Total Marks- | |
| | | Theory | Tutorial |
| Type of Course: CT-1 | | | |

Unit I

Introduction to Data Mining: Introduction: Scope of Data Mining: What is Data Mining; How does Data Mining Works, Predictive Modelling: Data Mining and Data Warehousing: Architecture for Data Mining: Profitable Applications: Data Mining Tools. Business Intelligence: Introduction, Business Intelligence, Business Intelligence tools, Business Intelligence Infrastructure, Business Intelligence Applications, BI versus Data Warehouse, BI versus Data Mining, Future of BI.

Unit II

Data Pre-processing: Introduction, Data Pre-processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Techniques- An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.

Unit III

Classification, Clustering, outlier analysis: Decision Tree Induction –Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

Tutorial (1- Credit)

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

Reference Books:

1. Kamber and Han, “Data Mining Concepts and Techniques”, Hart Court India P.Ltd. Elsevier Publications Second Edition, 2001
2. Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & Sons, 2004.

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|-----------------------------------------------------------------------|--|-------------------------|--------------------|
| Course Title: Information Technology (Artificial Intelligence) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: AIT722N Type of Course: CT-1 | | Total Marks- | |
| | | Theory | Tutorial |

Unit I

Introduction to Intelligent Systems and AI History. Definitions, Problem Solving Strategies, Applications, Physical Symbol System Hypothesis, production systems, Characteristics of production, Agents and Environments – Concept of rationality – Nature of environments – Structure of agents.

Unit II

Understanding Rule-Based Systems, Basics of Knowledge and Knowledge Representation, Roles, and Collaboration in Expert System Development. Anatomy of Rule-Based Expert Systems, Managing Uncertainty in Expert Systems, Introduction to Uncertainty Management.

Unit III

Probability Concepts and Bayesian Reasoning, Decision Making Tools: FORECAST. Simplifying Complex Systems with Fuzzy Logic and Neural Networks, Introduction to Fuzzy Logic and Fuzzy Sets, Applications of Fuzzy Logic for Real-World Problems. Introduction to Artificial Neural Networks, Neurons, and Layers, Basics of Training and Learning in Neural Networks.

Tutorial (1- Credit)

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

Reference Books:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill.
2. Introduction to AI & Expert System: Dan W.Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Artificial Intelligence, A Modern Approach. Stuart Russell and Peter Norvig.

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|-----------------------------------------------------|--|-------------------------|--------------------|
| Course Title: Information Technology (LaTeX) | | Total Credits-04 | |
| | | Theory-03 | Tutorial-01 |
| Course Code: AIT822N | | Total Marks- | |
| | | Theory | Tutorial |
| Type of Course: CT-1 | | | |

Unit I

Introduction to LaTeX. Various integrated development environment (IDE) for LaTeX. Installation of TexStudio / MikeTeX. Online Overleaf access. Structure of LaTeX document.

Creating a Title, Sections, Command names, and arguments, Labelling Table of Contents, Font Effects, Colored Text, Font Sizes, Comments & Spacing Special Characters, Line breaking. Theorem like declarations, comments within text.

Unit II

Lists, Tables, Figures - List of figures, Equations: Inserting Equations and Mathematical Symbols, Inserting References: Inserting the Bibliography Styles, Technical Report: Writing Thesis/project/report, Classes: article, book, report, beamer, slides.

Introduction to mathematics environment, writing Greek symbols and some basic mathematics type structure like fractions, superscript, subscript, overline, underline etc. Matrix, determinant and other similar structure. Equations and Arrays. Equation references. Introduction to amsmath package. Various mathematical operation symbols.

Unit III

Inserting pictures and tables. Special environments enumerates, tabular, cases etc. Citation in LaTeX using BibTeX. Creating reference database as .bib file. Bibliography styles.

Introduction to Beamer, Main features: How to set the document class to beamer, its title, subtitle, author, institute, and date information, Bold, italics and underlining. Highlighting important sentences/words, Customizing presentation: themes (rows) and color themes (columns), Fonts and columns.

Tutorial (1- Credit)

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

Reference Books & Links:

Guide to LATEX, fourth edition, Helmut Kopka, Patrick W.Daly

https://www.overleaf.com/learn/latex/Beamer#Reference_guide

<https://mirror.niser.ac.in/ctan/macros/latex/contrib/beamer/doc/beameruserguide.pdf>