R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Engineering Mathematics-III**	**IT -3011**	**3L-1T-0P**	**4**

Course Outcomes:

CO1 Analyze and solve engineering problems using Laplace Series.

CO2 Analyze and solve engineering problems using Fourier Series.

CO3 To apply partial differential techniques to solve the physical engineering problems..

CO4 Develop problem-solving techniques needed to accurately calculate probabilities. Apply problem-solving techniques to solving real-world events.

Course Contents:

Unit-I

Fourier series: Introduction of Fourier series, Fourier series for Discontinuous functions, and Fourier series for even and odd function. Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

Unit -II

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit-III

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi, Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods.

Unit-IV

Solution of Ordinary Differential Equations (Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit -V

Concept of Probability: Probability: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Testing of Hypothesis |: Students t-test, Fisher's z-test, Chi-Square Method.

References

(i) Higher Engineering Mathematics by BS Grewal, Khanna Publication

(ii) Advance Engineering Mathematics by D.G.Guffy
(iii) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
(iv) Engineering Mathematics by S S Sastri. P.H.I.
(v) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
(vi) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
(vii) Pobability and Statistics by Ravichandran, Wiley India
(viii) Mathematical Statistics by George R., Springe

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Data structure & Algorithms	IT -3021	4L-0T-2P	6

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the concept of Dynamic memory management, data types, algorithms, Big O notation

CO2 Understand basic data structures such as arrays, linked lists, stacks and queues.

CO3 Describe the hash function and concepts of collision and its resolution methods.

CO4 Solve problem involving graphs, trees and heaps.

CO5 Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Course Contents:

UNIT- I

Introduction: to Notions of data type, abstract data type, and data structures. Relation to the notion of classes and objects in object oriented programming. Importance of algorithms and data structures in programming. Notion of Complexity covering time complexity and space complexity. Worst case complexity, Average case complexity. Big Oh Notation. Examples of simple algorithms and illustration of their complexity. Introduction to recurrence relations. Iteration and Recursion- Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.

UNITI-II

List ADT. Implementation of lists using arrays and pointers. Stack ADT. Queue ADT. Implementation of stacks and queues. Dictionaries, Hash tables: open tables and closed tables. Analysis of hashing. Skip lists and analysis.

UNIT-III

Binary Trees- Definition and traversals: preorder, postorder, inorder. Common types and properties of binary trees. Counting of binary trees. Huffman coding using binary trees. Binary search trees : worst case analysis and average case analysis. AVL trees. Red-Black Trees, Splay trees. Priority Queues - Binary heaps: insert and deletemin operations and analysis. Binomial queues.

UNIT-IV

Directed Graphs- Data structures for graph representation. Shortest path algorithms: Dijkstra (greedy algorithm) and Bellman-Ford (dynamic programming). Depth- first search and Breadth-first search. Directed acyclic graphs. Undirected Graphs- Depth-first search and breadth-first search.Minimal spanning trees and algorithms (Floyd and Kruskal) and implementation. Application to the travelling salesman problem.

UNIT-V

Sorting- Bubblesort, selection sort, insertion sort, Shell sort; Quicksort; Heapsort; Mergesort; Radix sort; Analysis of the sorting methods. Selecting the top k elements. Lower bound on sorting.

Text Books:

1. Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft , Addison- Wesley Series (1983)
2. Data Structures and Algorithm Analysis in Java (3rd Edition) by Mark Allen Weiss, Addison Wesley, (2011).

Reference Books:

1. T.H. Cormen, C.E. Leiserson, and R.L. Rivest. *Introduction to Algorithms*. The MIT Press and McGraw-Hill Book Company, Cambridge, Massacusetts, 1990 (Available in Indian Edition).
2. Steven S. Skiena. *The Algorithm Design Manual*. Springer, Second Edition, 2008.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Computer Organization and Architecture**	**IT -3031**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Explain the organization of basic computer, its design and the design of control unit.

CO2 Understand basic data structures such as arrays, linked lists, stacks and queues

CO3 Describe the operations and language of the register transfer, micro operations and input-output organization.

CO4 Understand the organization of memory and memory management hardware.

CO5 Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization

Course Contents:

UNIT-I

Basic Structure Of Computers

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT-II

Arithmetic Unit

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT -II

Basic Processing Unit

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control

– Microprogrammed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT-IV

Memory System

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary

storage.

UNIT-V

I/O Organization

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

TEXT BOOK :

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, 2002.

REFERENCES :

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
2. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.
3. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Operating System	IT -3041	4L-0T-2P	6

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the basics of operating systems like kernel, shell, types and views of operating systems

CO2 Understand basic data structures such as arrays, linked lists, stacks and queu Describe the various CPU scheduling algorithms and remove deadlocks

CO3 Explain various memory management techniques and concept of thrashing.

CO4 Use disk management and disk scheduling algorithms for better utilization of external memory

CO5 Recognize file system interface, protection and security mechanisms

Course Contents:

UNIT-I

INTRODUCTION

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter- process Communication.

UNIT-II

SCHEDULING

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria– Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization– Critical regions
– Monitors.

UNIT-III

DEADLOCKS

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention– Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management– Swapping

– Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT-IV

PAGING AND FILE SYSTEM

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames– Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

UNIT-V

FILE MANAGEMENT

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

REFERENCES :

1. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
4. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.

List of Experiment

1. Write a program to implement FCFS CPU scheduling algorithm.
2. Write a program to implement SJF CPU scheduling algorithm.
3. Write a program to implement Priority CPU Scheduling algorithm.
4. Write a program to implement Round Robin CPU scheduling algorithm.
5. Write a program to compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. Write a program to implement classical inter process communication problem.
7. Write a program to implement classical inter process communication problem.
8. Write a program to implement classical inter process communication problem.
9. Write a program to implement & Compare various page replacement algorithm.
10. Write a program to implement & Compare various Disk & Drum scheduling Algorithms.
11. Write a program to implement Banker's algorithms.
12. Write a program to implement Remote Proccedure Call (RPC).
13. Write a Devices Drivers for any Device or pheriperal.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Value Education	IT -3051	4L-0T-2P	6

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 To learn the philosophy of Life, personal value, social value, mind cultural value and personal health.

CO2 To learn professional ethical values, codes of ethics, responsibilities, safety, rights and related global issues. Understand the basics of operating systems like kernel, shell, types and views of operating systems.

Course Contents:

UNIT-1

Concepts of Values-Definition and Types of values –The need for Education in values-Challenges for Value adoption-Character development-Vision of a better world

UNIT-2

Inculcation of values
Classification of values- Personal Values-Family Values-Social Values-Spiritual values-Benefits of value adoption

UNIT-3

Values for Professional excellence
Definition-Purpose-implementation-situations to adopt-reflection questions-quotable quotes of Active listening- Decision making-Determination-Perseverance-Discipline-Responsibility

UNIT-4

Busines ethics
Ethics and Entrepreneurship- Professional Ethics –Ethical choices- Resolving Ethical Dilemmas-Leadership and Social Responsibility- Corporate Social Responsibility

UNIT-5

Qualityof Life Dealing with change-Trends, Organizations and the Individual-Self and the world-Quality from within-Relating to others-The dynamics of personalpowers

UNIT-6

Exploring the self True Identity-Anatomy of the self-The cyclic processes within the self-States of the awareness-Innate and Acquired qualities-Empowering the self

UNIT-7

Understanding Self-Esteem

Know self-esteem-Understanding the self-Components of self-esteem-Association with self-esteem-Levels of self-esteem-Reflection exercises

UNIT-8

Principles of living

Be introspective-Be an observer-Being optimistic-Appreciate differences-Don't compare yourself with others- Live atpresent

UNIT-9

Practical Meditation

Why meditate?-Soul consciousness-The supreme-Karma-Timeless dimension-The eight powers

UNIT-10

Exercises for Practice

Quiet reflection- Practice introversion-Being an observer-Stand back and observe -Self awareness (Soul consciousness)-Experiencing Body free stage-Reflect on original qualities-Visualize the Divine-Think attributes of the Supreme-Developing a living relationship-Surrender to God-Create Good wishes for all-Visualization in Meditation: Orbs of Light- The forest-The Balloon.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – III

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Software Lab 1 (C++)**	**IT -3061**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Introduces Object Oriented Programming concepts using the C++ language.

CO2 Introduces the principles of data abstraction, inheritance and polymorphism.

CO3 Introduces the principles of virtual functions and polymorphism.

CO4 Introduces handling formatted I/O and unformatted I/O

Course Contents:

UNIT–I

Object-Oriented Thinking: Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts-Abstraction, Encapsulation, Inheritance and Polymorphism. C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement-if, switch, while, for, do, break, continue, goto statements. Functions -Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives.

UNIT-II

C++ Classes and Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

UNIT–III

Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class. Virtual Functions and Polymorphism: Static and Dynamic binding, virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

UNIT–IV

C++ I/O: I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.

UNIT-V

Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception, Catching all exceptions.

TEXT BOOKS:

1.The Complete Reference C++, 4thEdition, Herbert Schildt, Tata McGraw Hill.

2.Problem solving with C++: The Object of Programming, 4thEdition, Walter Savitch, Pearson Education.

REFERENCES:

1.The C++ Programming Language, 3rdEdition, B.Stroutstrup, Pearson Education.

2.OOP in C++, 3rdEdition, T.Gaddis, J.Walters and G.Muganda, Wiley DreamTech Press.3.Object Oriented Programming in C++, 3rdEdition, R.Lafore, Galigotia Publications Pvt Ltd

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Environmental Engineering**	**IT -4011**	**4L-0T-0P**	**4**

Course Outcomes:

CO1 Understand key current environmental problems

CO2 Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil

CO3 Be able to plan strategies to control, reduce and monitor pollution.

CO4 Be able to select the most appropriate technique to purify and/or control the emission of pollutants.

CO5 Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity.

Course Contents:

UNIT I

Ecosystem – Principles of ecology, ecosystem concept: Biotic and biotic components of ecosystem, Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Biodiversity: Threats and conservation, Food Chain.

UNIT II

Energy General idea about: Natural Resources , current status and types of resources Non Renewable Sources of energy, coal, oil, Gas, Hydrogen, nuclear sources

UNIT III

Air Pollution & Sound Pollution - Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution Environmental problems, (Global warming, ozone depletion and acid rain) General idea about forest ecosystem, grassland ecosystem, wetland ecosystems and aquatic Biogeochemical Cycling: Oxygen cycle, Carbon cycle, Nitrogen cycle, Sculpture cycle and water cycle.

UNIT IV

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent.

Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT V

Society & Ethics – Impact of waste on society. Solid waste management (Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, water preservation rain water collection. Environmental Impact Assessment.

REFERENCES :

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Database Management System**	**IT -4021**	**4L-0T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand database concepts and structures and query language

CO2 Understand the E R model and relational model

CO3 To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

CO4 Understand Functional Dependency and Functional Decomposition.

CO5 Apply various Normalization techniques

Course Contents:

UNIT-I

Introduction And Conceptual Modeling : Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT-II

Relational Model : SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependencies and Normalization for Relational Databases (up to BCNF).

UNIT-III

Data Storage And Query Processing : Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files – Different types of Indexes-B-Tree - B+ Tree – Query Processing.

UNIT-IV

Transaction Management : Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT-V

Current Trends : Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

TEXT BOOK :

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fourth Edition, McGraw-Hill, 2002.

REFERENCES :

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.

2. Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.

3. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2000.

4. Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003.

DBMS LAB

LIST OF EXPERIMENTS

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Database design using E-R model and Normalization.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System.
10. Design and implementation of Library Information System.

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B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Software Engineering	IT -4031	4L-0T-2P	6

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Students will be able to decompose the given project in various phases of a lifecycle.

CO2 Students will be able to choose appropriate process model depending on the user requirements.

CO3 Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance

CO4 Students will be able to know various processes used in all the phases of the product.

CO5 Students can apply the knowledge, techniques, and skills in the development of a software product.

Course Contents:

UNIT-I

SOFTWARE PROCESS

Introduction –S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

UNIT-II

SOFTWARE REQUIREMENTS

Functional and non-functional - user – system –requirement engineering process – feasibility studies– requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping - S/W document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT-III

DESIGN CONCEPTS AND PRINCIPLES

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems- Real time software design – system design – real time executives – data acquisition system - monitoring and control system. SCM – Need for SCM – Version control – Introduction to SCM process – Software configuration items.

UNIT-IV

TESTING

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms– regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

UNIT-V

SOFTWARE PROJECT MANAGEMENT

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes – program evolution dynamics – software maintenance – Architectural evolution. Taxonomy of CASE tools.

TEXT BOOK :

1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 5th edition, 2001.

REFERENCES :

1. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.

Practical and Lab work Lab work should include a running case study problem for which different deliverables at the end of each phase of a software development life cycle are to be developed. This will include modeling the requirements, architecture and detailed design. Subsequently the design models will be coded and tested. For modeling, tools like Rational Rose products. For coding and testing, IDE like Eclipse, Net Beans, and Visual Studio can be used.

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B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Analog and Digital Communication**	**IT -4041**	**4L-0T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Explain the differences between analog and digital communication systems and compare their respective advantages and disadvantages.

CO2 Understand signal multiplexing, modulation and demodulation; bandwidth requirements; signal power spectrum requirements for analog and digital communication systems.

CO3 Apply signal and system analytical tools in both the time and frequency domains; including Fourier transforms, frequency response functions, time duration versus bandwidth, and convolution.

CO4 Understand amplitude, phase and frequency modulation and demodulation and how they compare

CO5 Application of the Sampling theorem to analog-to-digital conversion and understand the limitations of practical sampling, quantization and encoding.

Course Contents:

UNIT-I

BASIC CONCEPTS OF ALGORITHMS

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT-II

MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm– Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT-III

ANALYSIS OF SORTING AND SEARCHING ALGORITHMS

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching– Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree- Traversal and Related Properties – Decrease and Conquer – Insertion Sort – Depth first Search and Breadth First Search.

UNIT-IV

ALGORITHMIC TECHNIQUES

Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort – Dynamic Programming – Warshall's and Floyd's Algorithm – Optimal Binary Search trees– Greedy Techniques – Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman trees.

UNIT-V

ALGORITHM DESIGN METHODS

Backtracking – n-Queen's Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

TEXT BOOK :

1. Samuel O. Agbo and Matthew O. Sadiku***, Principles of Modern Communication Systems***, Cambridge University Press, Cambridge, United Kingdom, 2017. ISBN 978-1-107-10792-2

REFERENCES :

1. B.P. Lathi and Zhi Ding, ***Modern Digital and Analog Communication Systems***, 4th Edition, Oxford University Press, New York, 2009. ISBN 978-0-19-533145-5

2. Simon Haykin and Michael Moher, ***Communication Systems***, 5th Edition, John Wiley and Sons, Inc., New York, 2009. ISBN 978-0-471-69790-9

B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Computer Network**	**IT -4051**	**4L-0T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand and describe the layered protocol model.

CO2 Understand and explain Data Communications System and its components.

CO3 Identify the different types of network topologies and protocols.

CO4 Identify the different types of network devices and their functions within a network

CO5 Understand and building the skills of subnetting and routing mechanisms

Course Contents:

UNIT-I

ANALOG COMMUNICATION

Introduction to Communication Systems – Modulation – Types – Need for Modulation. Theory of Amplitude Modulation – Evolution and Description of SSB Techniques – Theory of Frequency and Phase Modulation – Comparison of Analog Communication Systems (AM – FM – PM).

UNIT-II

PULSE AND DATA COMMUNICATION

Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) – Comparison of various Pulse Communication System (PAM – PTM – PCM). Data Communication: History of Data Communication – Standards Organizations for Data Communication- Data Communication Circuits – Data Communication Codes – Data communication Hardware – serial and parallel interfaces.

UNIT-III

DIGITAL COMMUNICATION

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK)–Phase Shift Keying (PSK) – BPSK – QPSK – Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT-IV

SOURCE AND ERROR CONTROL CODING

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, Error Control Coding, linear block codes, cyclic codes – ARQ Techniques.

UNIT-V

USER RADIO COMMUNICATION

Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse – Channel Assignment and Handover Techniques – Overview of Multiple Access Schemes – Satellite Communication – Bluetooth.

TEXT BOOK :

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.

REFERENCES :

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003.

2. Larry L.Peterson and Peter S. Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.

3. Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.

4. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000.

5. Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.

NETWORKING LAB LIST OF EXPERIMENTS

All the programs are to be written using C:

1. Simulation of ARP / RARP.

2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.

3. Develop an application for transferring files over RS232.

4. Simulation of Sliding-Window protocol.

5. Simulation of BGP / OSPF routing protocol.

6. Develop a Client – Server application for chat.

7. Develop a Client that contacts a given DNS Server to resolve a given host name.

8. Write a Client to download a file from a HTTP Server.

9. Study of Network Simulators like NS2/Glomosim / OPNET

B.E. (Information Technology)

Second Year-Semester – IV

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Software Lab II (Java)**	**IT -4061**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Implement Object Oriented programming concept using basic syntaxes of control Structures, strings
and function for developing skills of logic building activity.

CO2 Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem

CO3 Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

CO4 Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development

CO5 Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events

Course Contents:

UNIT–I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT–II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector.Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT–III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT–V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, ”JAVA, How to Program”; PHI, Pearson.
2. E. Balaguruswamy, “Programming In Java”; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism

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B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Digital Circuit and System**	**IT -5011**	**4L-0T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Develop a digital logic and apply it to solve real life problems.

CO2 Analyze, design and implement combinational logic circuits.

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CO3 Classify different semiconductor memories.

CO4 Analyze, design and implement sequential logic circuits

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Course Contents:

UNIT-I

DIGITAL FUNDAMENTALS

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1‘s and 2‘s complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT-II

COMBINATIONAL CIRCUIT DESIGN

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

UNIT-III

SYNCHRONOUS SEQUENTIAL CIRCUITS

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT-IV

ASYNCHRONOUS SEQUENTIAL CIRCUITS

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits

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UNIT-V
MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PLA, PAL.
Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS

TEXT BOOKS:
1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition, TMH, 2003

REFERENCES:
1. John. F. Wakerly, Digital Design, Principles and Practices, Pearson Prentice Hall
2. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002

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B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Object Oriented Analysis and Design**	**IT -5021**	**3L-1T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Specify, analyze and design the use case driven requirements for a particular system

CO2 Model the event driven state of object and transform them into implementation specific layouts

CO3 Identify, Analyze the subsystems, various components and collaborate them interchangeably.

CO4 Understand the difference between writing programs for the software and doing analysis and design.

Course Contents:

UNIT-I

INTRODUCTION

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle.

UNIT-II

OBJECT ORIENTED METHODOLOGIES

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns – Frameworks Unified

Approach – Unified Modeling Language – Use case - class diagram - Interactive Diagram Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram..

UNIT-III

OBJECT ORIENTED ANALYSIS

Identifying use cases - Object Analysis - Classification – Identifying Object relationships – Attributes and Methods.

UNIT-IV

OBJECT ORIENTED DESIGN

Design axioms - Designing Classes – Access Layer - Object Storage - Object Interoperability.

UNIT-V

SOFTWARE QUALITY AND USABILITY

Designing Interface Objects – Software Quality Assurance – System Usability - Measuring User Satisfaction.

TEXT BOOK:

1. Ali Bahrami, “Object Oriented Systems Development”, Tata McGraw-Hill, 1999.
2. Martin Fowler, “UML Distilled”, Second Edition, PHI/Pearson Education, 2002.

REFERENCES :

1. Stephen R. Schach, “Introduction to Object Oriented Analysis and Design”, Tata McGraw-Hill, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch “The Unified Modeling Language Reference Manual”, Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, “UML Toolkit”, OMG Press Wiley Publishing Inc., 2004

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B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Theory of Computation	IT -5031(A)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Students will demonstrate knowledge of basic mathematical models of computation and describe how
they relate to formal languages.

CO2 Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.

CO3 Students will learn that certain problems do not admit efficient algorithms, and identify such problems.

CO4 will apply knowledge of computing and mathematics appropriate to the discipline .

CO5 will function effectively as a member of a team in order to accomplish a common goal.

Course Contents:

UNIT-I

AUTOMATA

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT-II

REGULAR EXPRESSIONS AND LANGUAGES

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

UNIT-III

CONTEXT-FREE GRAMMAR AND LANGUAGES

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

UNIT-IV

PROPERTIES OF CONTEXT-FREE LANGUAGES

Normal forms for CFG – Pumping Lemma for CFL - Closure Properties of CFL – Turing Machines– Programming Techniques for TM.

UNIT-V

UNDECIDABILITY

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem - The classes P and NP.

TEXT BOOK :

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

REFERENCES :

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

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B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Microprocessor & Interfacing**	**IT -5031(B)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Understand the basic concepts of microcomputer systems.
CO2	Understand the architecture and software aspects of microprocessor 8086.
CO3	Write Assembly language program in 8086.
CO4	Interface peripherals for 8086.
CO5	Design elementary aspect of microprocessor based system..

Course Contents:

UNIT-1

8086 Hardware Architecture

Intel 8086 - Pin Description – Operating Modes of 8086 – Pin description for Minimum Mode – – Pin Description for Maximum Mode – Register Organization of 8086 – Bus Interface Unit – Execution Unit – Interrupts – 8086 Based Computer System

UNIT-2

Programming The 8086

Addressing modes of 8086 – 8086 Instruction Groups – Addressing Mode Byte – Segment Register Selection – Segment Override – 8086 Instructions – Assembly Language Programs for 8086..

UNIT-3

Memory And I/O Interfacing

Basic Interfacing concept – Memory Mapped I/O – I/O mapped I/O – Generation of Control Signals – 8086 Addressing and Address Decoding – ROM Address Decoding – RAM Address Decoding – Interfacing I/O Device 74LS138 and PROM Decoder.

UNIT-4

Programmable Peripheral Devices

Interfacing 8255A Programming 8255A - Mode 0-Mode 1 – Mode 2 Operations - 8254- DMA Data Transfer – Interfacing 8257 DMA Controller – Interfacing 8259 – Serial Data Communication – Interfacing 8251.

UNIT-5

Advanced Microprocessors

Power Microprocessor PC601 – Pentium PRO Microprocessor – The Pentium Pro Processor Pipeline – Pentium II – Celeron – Pentium III – Pentium 4 – Itanium Processor – Alpha Microprocessor

References

1. Microprocessor and interfering programming and Hardware - By Doughles V. Hall - Tata Mc Hill
2. Microprocessors and Microcontrollers Architecture,Programming and System Design 8085,8086,8051,8096, Krishna Kant, PHI learning Pvt.Ltd -2013

Third Year-Semester – V
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Numerical Method and Statistics**	**IT -5031(C)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Ability to flowchart and pseudocode logic for problem solving.

CO2 Solve root finding problems using several methods.

CO3 Solve systems of linear algebraic equations using Gauss elimination and LU decomposition

CO4 Perform regression and interpolation on datasets.

Course Contents:

UNIT-1

Mathematical Modeling and Engineering Problem Solving: Simple Mathematical Model, Conservation Laws and Engineering Problems

Approximations and Round-Off Errors: Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors

Truncation Errors and the Taylor Series: The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty

UNIT-2

Solutions of Algebraic and Transcendental Equations: The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method

Interpolation: Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.

UNIT-3

Solution of simultaneous algebraic equations (linear) using iterative methods: Gauss-Jordan Method, Gauss-Seidel Method.

Numerical differentiation and Integration: Numberical differentiation, Numerical integration using Trapezoidal Rule, Simpson's 1/3rd and 3/8th rules

Numerical solution of 1st and 2nd order differential equations: Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2 nd Order Differential Equations.

UNIT-4

Least-Squares Regression: Linear Regression, Polynomial Regression, Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression

Linear Programming: Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution.

UNIT-5

Random variables: Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance**.**
Distributions: Discrete distributions: Uniform, Binomial, Poisson, Bernoulli, Continuous distributions: uniform distributions, exponential, (derivation of mean and variance only and state other properties and discuss their applications) Normal distribution state all the properties and its applications

References

1. Introductory Methods of Numerical Methods, (2nd Edn.) S S Shastri, Prentice Hall Inc.
2. Numerical Methods for Engineers (6th Edn), Steven C. Chapra, Raymond P. Canale, Tata Mcgraw Hill
3. Numerical Analysis(9th Edn), A Richard L. Burden, J. Douglas Faires, Cengage Learning

Third Year-Semester – V
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Internet & Web Technology	IT -5041(A)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Create web pages using PHP

CO2 Identify the difference between the HTML PHP and XML documents

CO3 Identify the engineering structural design of XML and parse tree

CO4 Understand the concept of JAVA SCRIPTS

CO5 Understand the JSP and Servlet concepts.

Course Contents:

UNIT-I

Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies.
File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories

UNIT-II

Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications.

UNIT-III

XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition,
XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java

UNIT-IV

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling

Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC**.**

UNIT-V

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP.

TEXT BOOK :

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCES :

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**E-Commerce and Governance**	**IT -5041(B)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 the basic concepts and technologies used in the field of management information systems

CO2 the processes of developing and implementing information Systems. Be aware of the ethical, social, and security issues of information systems

CO3 the role of information systems in organizations, the strategic management processes, and the implications for the management

CO4 how various information systems work together to accomplish the information objectives of an organization

Course Contents:

UNIT-I

Introduction to E-Business and E-Commerce:-

Define the e-Commerce and e-Business, Define e-Commerce Types of EC transactions, Define e-Business Models. Internet Marketing and e-Tailing. Elements of e-Business Models. Explain the benefits and limitations of e-Commerce.

UNIT-II

E-Marketplaces: Structures, Mechanisms, Economics & impacts:-

Define e-Marketplace and Describe their Functions. Explain e-Marketplace types and their features. Describe the various types of auctions and list their characteristics. Discuss the benefits, limitations and impacts of auctions. E-Commerce in the wireless environment.

Competition in the DE and impact on industry.

UNIT-III

E-Business applications, E-Procurement and EPayment Systems:- Integration and e-Business suits. ERP, e-SCM, CRM, E-Payment. E-Procurement definition, processes, methods and benefits. Discuss the categories and users of smart cards. Describe payment methods in B2B EC.

UNIT-IV

The Impact of E-Business on Different Fields and Industries:- E-Tourism · Employment and Job Market Online Online Real Estate. Online Publishing and e-Books. Banking and Personal Finance Online. On-Demand Delivery Systems and E-Grocers. Online Delivery of Digital Products.

UNIT-V

E-Learning and Online Education:- Define electronic learning. Discuss the benefits and drawbacks of e-Learning. The e-Learning Industry. Discuss e-Content development and tools. Describe the major technologies used in e-Learning. Discuss the different approaches for e-Learning delivery. How e-Learning can be evaluated

Text Book:

1. Electronic Commerc**e:** A Managerial Perspective, Turban, E. et al., Prentice Hall-2008.
2. Frontiers of e-commerce, Ravi Kalakota, Pearson.
3. Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006
4. e-Learning Tools and Technologies, Horton and Horton, Wiley Publishing.

Third Year-Semester – V
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Java Programming	IT -5041(C)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 the knowledge of the structure and model of the Java programming language

CO2 use the Java programming language for various programming tasks

CO3 develop software in the Java programming language

CO4 evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

CO5 propose the use of certain technologies by implementing them in the Java programming language to solve the given problem

Course Contents:

UNIT-I

The Java Environment: Java Development Kit (JDK) , Java virtual machine, Java programming environment(compiler, interpreter, applet viewer, debugger), Java Applications Programming Interface(API),Basic idea of application and applet. Java as an object oriented language: objects, classes, encapsulation, inheritance and software reuse, polymorphism, abstract classes and abstract methods,: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces, Packages,scopeandlifetime;Accessspecifies;Constructors;Copyconstructor; this pointer; finalize() method; arrays; Memory allocation and garbage collection

UNIT-II

AWT: Containers and components, AWT classes, window fundamentals: Component, Container, Panel, Window, Frame, Canvas, AWT Controls, Layout Managers and Menus: adding and removing control, Labels, Button, Check Box, Radio Button, Choice, menu, Text area, Scroll list, Scrollbar; Frame; Layout managersflow layout, Grid layout, Border layout, Card layout. Java Event Handling Model: Java's event delegation model –Ignoring the event, Self-contained events, Delegating events; The event class hierarchy; There lationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eye Event, Mouse Event, Text Event,Window Event. Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTMLTags for applet Introduction to Swing: swing library, Building application susing Swings.

UNIT-III

Multithreading and Exception Handling: Overview of simple threads, Basic idea of multi threaded programming, Thread synchronization: Locks, synchronized methods, synchronized block,Thread

scheduling,Producer-consumerrelationship,Daemon thread,Basicidea ofexception handling,stack basedexecutionandexceptionpropagation,Exception types: Exception Handling:Try,Catch, Finally, Throw statement,Assertions

UNIT-IV

Input/Output:ExploringJavaI/ O.,Directories,streamclassesTheBytestream:Inputstream,outputstream,file input stream, file output stream, print stream, Randomaccess file, the character streams, Buffered reader, buffered writer, print writer, serialization. JDBC: JDBC-ODBCbridge; The connectivity model; The driver manager; Navigating there sult set object contents; java.sql Package; The JDBCexception classes; Connecting to Remote database.

UNIT-V

Java Networking: exploring java. Net package Networking Basics: Socket, Client server, reservedsockets, servers,Internetaddressing,TCPsockets,UDPsockets. RMI: Client/Server architecture, RMI registry services; Step sofcreating RMI Application and an example.

REFERENCES :

1. Naughton&Schildt"TheCompleteReferenceJava
2. TataMcGraw Hill.2.Deitel "Java-How toProgram:"PearsonEducation,Asia.
3. Horstmann&Cornell "CoreJava2" (Vol I&II) ,SunMicrosystems.
4. LvanBayross"Java2.0":BPBpublications.
5. Ivor Horton's"BeginningJava2,JDK5Ed.,WileyIndia.
6. JavaProgrammingfor theabsolutebeginnersByRussell,PHILearning

B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Lab(Linux)**	**IT -5051**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Explain the fundamental concepts of open-source operating system Linux

CO2 Understand the basic set of commands and editors in Linux operating system.

CO3 Discuss shell programming in Linux operating system

Course Contents:

Unit -I

Linux Utilities:

File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities, Backup utilities Sed - Scripts, Operations, Addresses, Commands,,awk - Execution, Fields and Records, Scripts, Operations, Actions, Assocoative Array, Strings and Mathematical functions, System commands in awk, Applications. Shell programming with Bourne Again Shell (bash): Introduction, Shell responsibilities, Pipes and redirection, here documents, Running a shell script, Shell as a programming language, Shell meta characters, File-name substitution, Shell variables, Command substitution, Shell commands, The environment, Quoting, test command, Control structures, Arithmetic in shell, Shell script examples, Interrupt processing functions, Debugging shell Scripts

Unit-II

Files and Directories:

File concepts, File types File system structure,file metadata - Inodes, kernel support for files, System calls for the file I/O operations- open,create,read,wrirte,close,lseek,dup2,file status information-stat family, file and record locking-fcntl function, file permissions- chmod, fchmod, file ownership-chown, lchown, fchown, links-soft links and hard links- symlink, link, unlink. Directories: Creating,,removing and changing Directories-mkdir,rmdir,chdir,obtaining current working directory-getcwd,directory contents,scanning directories- opendir, readdir, rewin functions.

Unit- III

Process:

Process concept, Layout of a C program image in main memory, Process environment – environment list, environment variables, getenv, setenv, Kernel support for process, Process identification, Process control - Process creation, replacing a process image, waiting for process,

Process termination, Zombie process, Orphan process, ,system call interface for process management – fork, vfork, exit, wait, waitpid, exec family, process groups, sessions and controlling Terminal, differences between threads and processes. Signals:

Introduction to signals, Signal generation, Signal handling, Kernel support for signals, signal function, Unreliable signals, Reliable signals, Signal functions: kill, raise, alarm, pause, abort, sleep.

Unit- IV

Inter process Communication:

Introduction to IPC,IPC between processes on a single computer system, IPC between processes on different systems, Pipes-creationIPC between related processes using FIFOs(Named pipes), differences between unnamed and named pip s, popen and pclose library functions. Message Queues: Kernel support for messages, APIs for message queues, Client/Server example Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

Unit-V

Shared Memory:

Kernel support for Shared Memory, APIs for Shared Memory, Shared Memory example Sockets: Introduction to Berkley Sockets, IPC over a network, client – server model, Socket address structures (Unix domain and internet domain) , Socket system calls for connection oriented protocol and connectionless protocol, example- client/server programs- single server-client connection, multiple simultaneous clients, socket options- setsockopt and fcntl system calls, comparison of IPC mechanisms.

Text Books

1. Unix System Programming using C++, T.Chan, PHI (Unit III to Unit VIII)

2. Unix Concepts and Applications, 4th Ed, Sumitabha Das, TMH

3. Unix Network Programming, W.R.Stevens,PHI.

Reference Books

1. Begining Linux Programming, 4th Edition, N. Matthew, R.Stones, Wrox, Wiley India Edition.

2. Unix for Programmers 3rd Ed, Graham Glass & King Ables, Pearson Education.

3. System Programming with C and Unix, A.Hoover, Pearson.

4. Unix System Programming, communication, concurrency and Threads, K.A. Robbins and S.Robbins, Pearson Education.

5. Unix Shell Programming, S.G. Kochan and P.Wood, 3rd edition, Pearson Education.

6. Shell Scripting, S.Parker, Wiley India Pvt. Ltd.

7. Advanced Programming in the Unix Environment, 2nd Ed, W.R.Stevens, Pearson Education

8. Unix and Shell Programming, B.A.Forouzan&R.F.Gilberg,Cengage Learning

9. Linux System Programming, Robert Love, O'Reily, SPD.

10. C Programming Language, Kernighan and Ritchie, PHI

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B.E. (Information Technology)

Third Year-Semester – V

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Lab(Python)**	**IT -5061**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Write, Test and Debug Python programs

CO2 Implement Conditionals and Loops for Python programs

CO3 Use functions and represent Compound data using Lists, Tuples and Dictionaries

Course Contents:

Unit-I

Introduction to Python Programming Language. :

Introduction to Python Language, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Built In Functions

Unit-II

Data Collections and Language Component :

Introduction, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical,
Operators, True or False, Bit Wise Operators, The while Loop, break and continue, The for Loop, Lists,
Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections.

Unit- III

Object and Classes :

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization
Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes

Unit- IV

Functions and Modules :

Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions

in a Dictionary, Lambda, Modules, Standard Modules – sys, Standard Modules – math, Standard Modules – time, The dir Function

Unit-V

I/O and Error Handling In Python :

Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

LIST OF EXPRIMENTS

1. Running instructions in Interactive interpreter and a Python Script.
2. Write a program to purposefully raise Indentation Error and correct it.
3. Scientific problem solving using decision making and looping.
4. Simple programming for one dimensional and two dimensional arrays.
5. Python Programing to explore string functions.
6. Utilizing 'Functions' in Python
    - Find mean, median, mode for the given set of numbers in a list.
    - Write a function dups to find all duplicates in the list.
    - Write a function unique to find all the unique elements of a list.
    - Write function to compute gcd, lcm of two numbers
7. Demonstrate the use of Lists, Dictionaries.
8. Write a program to implement Turtle.
9. Building a Classical Data Structure using Python Programming.
10. Implement Searching Operations: Linear and Binary Search.
11. To sort the 'n' numbers using: Selection and Insertion Sort.
12. Find the most frequent words in a text read from a file.
13. Demonstrate Exceptions in Python.
14. Simulate elliptical orbits and bouncing ball using Pygame

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Shroff "Learning Python: Powerful Object-Oriented Programming; Fifth edition, 2013.
3. David M.Baezly "Python Essential Reference". Addison-Wesley Professional; Fourth edition, 2009.
4. David M. Baezly "Python Cookbook" O'Reilly Media; Third edition (June 1, 2013) by.
5. http://www.edx.org

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Wireless and Mobile Computing**	**IT -6011**	**4L-0T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Explain the basic concepts of wireless network and wireless generations

CO2 Demonstrate the different wireless technologies such as CDMA, GSM, GPRS etc

CO3 Explain the design considerations for deploying the wireless network infrastructure

CO4 Differentiate and support the security measures, standards. Services and layer wise security considerations

Course Contents:

Unit-I

Antenna , radiation pattern, antenna types, antenna gain, propagation modes, types of fading. Model for wireless digital communication, multiple access technique-SDMA, TDMA, FDMA, CDMA, DAMA, PRMA, MAC/CA, Cellular network organization, operations of cellular system, mobile radio propagation effects, handoff, power control, sectorization, traffic engineering, Infinite sources, lost calls cleared, grade of service, poison arrival process.

Unit-II

GSM- Services, system architecture, radio interface, logical channels, protocols, localization and calling, handover, security, HSCSD, GPRS-architecture, Interfaces, Channels, mobility management DECT, TETRA, UMTS.

Unit-III

IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer , MAC management, HIPERLAN-protocol architecture, physical layer, access control sub layer, MAC sub layer. Bluetooth-user scenarios- physical layer, MAC layer.

Unit-IV

Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, transaction oriented TCP. Introduction to WAP.

Unit-V

Intruders, Intrusion detection, password management, viruses and related threads, worms, Trojan horse defense, difference biometrics and authentication system, firewall design principle.

References:-

1 J. Schiller, “Mobile Communication”, Addision , Wiley
2 William Stalling, “Wireless Communication and Network”, Pearson Education
3 Upena Dalal,” Wireless Communication”, Oxford Higher Education
4 Dr. Kamilo Feher, “Wireless Digital communication”, PHI
5 William C.Y Lee, “Mobile Communication Design Fundamental” , John Wiley.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Compiler Design	IT -6021	3L-1T-2P	6

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the different phases of compiler.

CO2 Design alexical analyzer for a sample language.

CO3 Apply differen tparsing algorithms to develop the parsers for a given grammar.

CO4 Understand syntax-directed translation and run-time environment.

CO5 Learn to implement code optimization techniques and a simple code generator.

Course Contents:

UNIT-I

INTRODUCTION TO COMPILERS

Structure of a compiler–Lexical Analysis–Role of Lexical Analyzer–Input Buffering–Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata– Minimizing DFA.

UNIT-II

SYNTAX ANALYSIS

Role of Parser– Grammars– Error Handling– Context-free grammars – Writing a grammar–TopDown Parsing-General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LRParser-LR(0) Item Construction of SLR Parsing Table-Introduction to LALR Parser-Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT-III

INTERMEDIATE CODE GENERATION

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT-IV

RUN-TIME ENVIRONMENT AND CODE GENERATION

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management-Issues in Code Generation-Design of a simple Code Generator.

UNIT-V

CODE OPTIMIZATION

Principal Sources of Optimization–Peep-hole optimization-DAG-Optimization of Basic Blocks- Global Data Flow Analysis- Efficient Data Flow Algorithm.

TEXT BOOK:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, SecondEdition, Pearson Education,2009.

REFERENCES:

4. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers,2002.
5. Steven S. Muchnick, Advanced Compiler Design and Implementation‖, Morgan Kaufmann Publishers -Elsevier Science,India,IndianReprint2003.
6. Keith D Cooper and Linda Torczon, Engineering a Compiler‖, Morgan Kaufmann Publishers ElsevierScience,2004.
7. V. Raghavan, Principles of Compiler Design‖, Tata McGraw Hill Education Publishers,2010.
8. AllenI.Holub, CompilerDesignin C‖, Prentice-HallSoftwareSeries,1993.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Artificial Intelligence	IT -6031(B)	4L-0T-0P	4

Course Outcomes:

CO1 To acquire the knowledge of basic artificial intelligence

CO2 To acquire the knowledge of searching strategies of AI

CO3 To acquire the knowledge of game playing techniques and planning of AI

CO4 To understand the concept of statistical methods for reasoning and logic

CO5 To acquire the knowledge of expert systems and other learning methods of AI

Course Contents:

UNIT-I

Introduction: Introduction to Artificial Intelligence (AI), Foundations of AI, History of AI, Real life examples of AI, Turing test for AI, AI techniques, Problem Solving- Formulating problems, problem types, states and operators, state space**.**

UNIT-II

Search Techniques in AI: Search algorithms in AI, Types of AI search, Uninformed search, Informed search, heuristic functions, Depth first search, Breadth first search, Best first search, Hill climbing algorithm, A* algorithm, AO* algorithm,Iterative deepening A*(IDA), small memory A*(SMA).

UNIT-III

Game Playing and Planning:Perfect decisiongame, imperfect decision game, evaluation function, alpha-beta pruning, Minimax search, Planning, Components of planning, Goal stack planning, partial order planning, planning in theblocks world, hierarchical planning, conditional planning.

UNIT-IV

Reasoning and Logic: Probability and Bayes' Theorem,Bayesian networks,Dempster-Shafer theory, Representation, Inference, Propositional Logic, predicate logic (firstorder logic), logical reasoning, forward chaining, backward chaining.

UNIT-V

Expert Systems and Other Learning Methods:Representation, Expert system shells, Knowledge acquisition, neural networks, reinforcement learning, genetic algorithm, natural language processing.

Text Book:

1. Artificial Intelligence3e by Elaine Rich, Kevin Knight, Shivashankar B Nair, (Tata Mcgraw Hill)
2. Artificial Intelligence A Modern Approach by Stuart Russell, Peter Norvig (Prentice Hall Series)

Reference Books:

1. A First Course in Artificial Intelligence by Deepak Khemani (Tata McGraw Hill)
2. Grokking Artificial Intelligence Algorithms by RishalHurbans (Manning Pub)

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Computer Graphics & Multimedia**	**IT -6031(A)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO 1 Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

CO 2 Render projected objects to naturalize the scene in 2D view and use of illumination models for this

CO 3 To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CO 4 To define the fundamentals of animation, virtual reality and its related technologies.

CO 5 To design an application with the principles of virtual reality

Course Contents:

UNIT-I

OUTPUT PRIMITIVES: Introduction - Line - Curve and Ellipse Drawing Algorithms –Attributes – Two- imensional Geometric Transformations – Two-Dimensional Clipping and Viewing.

UNIT-II

THREE-DIMENSIONAL CONCEPTS

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.

UNIT-III

MULTIMEDIA SYSTEMS DESIGN

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards –Multimedia Databases.

UNIT-IV

MULTIMEDIA FILE HANDLING

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies –

Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval Technologies.

UNIT-V

HYPERMEDIA

Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards – Integrated Document management – Distributed Multimedia Systems.

Text Book:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, 2003.
2. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003

Reference Books:

1. A First Course in Artificial Intelligence by Deepak Khemani (Tata McGraw Hill)
2. Grokking Artificial Intelligence Algorithms by RishalHurbans (Manning Pub)

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Embedded System	IT -6031(C)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Explain the embedded system concepts and architecture of embedded systems

CO2 Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller

CO3 Select elements for an embedded systems tool

CO4 Understand the memory types used in embedded systems

CO5 Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Course Contents:

UNIT-I

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

UNIT-II

Embedded System Architecture: Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors.

UNIT-III

Input Output and Peripheral Devices Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock. Introduction to communication protocols: basic terminologies, concepts, serial protocol: I2C, CAN, firewire, USB.

Parallel protocols: PCI bus, IrDA, bluetooth, IEEE 802.11, wireless protocols.

UNIT-IV

Memory System Architecture Caches, virtual memory, MMU, address translation, memory and interfacing, memory write ability and storage performance. Memory types, composing memory – advance RAM interfacing, microprocessor interfacing I/O addressing, interrupts, direct memory access, arbitration multilevel bus architecture.

UNIT-V

Embedded System Supporting Technologies Difference between normal OS and RTOS, scheduling algorithms. Case study: Tiny OS, VxWorks, QNX. Overview of VLSI technology, introduction to device drivers. Case studies: washing machine, air-conditioning, auto focus camera.

References:

1. F Vahid, T Giogarvis, Embedded systems: A unified hardware/software approach, Wiley, 1999.

2. Raj Kamal, Embedded Systems Introduction, 2nd Ed., TMH publication, 2015.

3.David E Simons, An Embedded Software Primer, Pearson, 1999.

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B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Pattern Recognition**	**IT -6041(A)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Have knowledge of some existing applications of wireless sensor actuator networks

CO2 Learn the various hardware, software platforms that exist for sensor networks

CO3 Have knowledge of the various protocols for sensor networks

CO4 Analyze modeling and simulation of sensor networks

CO5 Understand what research problems sensor networks pose in disciplines such as signal processing, wireless communications and even control systems

Course Contents:

UNIT-I

Overview of Wireless Sensor Networks: Network Characteristics, Network Applications, Network Design Objectives, Network Design Challenges, Technological Background : MEMS Technology , Wireless Communication Technology , Hardware and Software Platforms, Wireless Sensor Network Standards, Introduction, Network Architectures for Wireless Sensor Networks, Classifications of Wireless Sensor Networks, Protocol Stack for Wireless Sensor Networks.

UNIT-II

Fundamental MAC Protocols, MAC Design for Wireless Sensor Networks, MAC Protocols for Wireless Sensor Networks: Contention-Based Protocols, Contention-Free Protocols, Hybrid Protocols. Introduction, Fundamentals and Challenges, Taxonomy of Routing and Data Dissemination Protocols, Overview of Routing and Data Dissemination Protocols: Location- Aided Protocols, Layered and In-Network Processing-Based Protocols, Data-Centric Protocols, Multipath-Based Protocols, Mobility-Based Protocols, QoS Based Protocols, Heterogeneity-Based Protocols.

UNIT-III

Introduction, Query Processing in Wireless Sensor Networks, Data Aggregation in Wireless Sensor

Networks, Node Localization: Concepts and Challenges of Node Localization Technologies, Ranging Techniques for Wireless Sensor Networks, Wireless Localization Algorithms, Wireless Sensor Node Localization.

UNIT-IV

Need for Energy Efficiency and Power Control in Wireless Sensor Networks, Passive Power Conservation Mechanisms: Physical-Layer Power Conservation Mechanisms, MAC Layer Power Conservation Mechanisms, Higher Layer Power Conservation Mechanisms, Active Power Conservation Mechanisms: MAC Layer Mechanisms, Network Layer Mechanisms, Transport Layer Mechanisms.

UNIT-V

Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and ZigBee Security .

References:

1. Wireless Sensor Networks A Networking Perspective, Jun Zheng & Abbas Jamalipour, a john Wiley & sons, Inc., publication .

2. Wireless sensor networks Technology, Protocols, and Applications , kazem sohraby, Daniel minoli, taieb znati , a john Wiley & sons, Inc., publication .

3. Fundamentals of wireless sensor networks theory and practice, Waltenegus Dargie, Christian Poellabauer, A John Wiley and Sons, Ltd., Publication.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Internet Of Things**	**IT -6041(B)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the vision of IoT from a global context.

CO2 Understand the application of IoT.

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CO3 Determine the Market perspective of IoT.

CO4 Use of Devices, Gateways and Data Management in IoT.

CO5 Building state of the art architecture in IoT.

Course Contents:

UNIT-I

IOT & WEB TECHNOLOGY - The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT-II

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT-III

IOT ARCHITECTURE -STATE OF THE ART – Introduction, State of the art, Architecture **REFERENCE MODEL**- Introduction, Reference Model and architecture, IoT reference Model, **IOT REFERENCE ARCHITECTURE**- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT-IV

IOT APPLICATIONS FOR VALUE CREATIONS

Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

UNIT-V

INTERNET OF THINGS PRIVACY, SECURITY AND GOVERNANCE

Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

TEXT BOOK :

1. Vijay Madisetti and Arshdeep Bahga, **"Internet of Things (A Hands-on-Approach)",** 1st Edition, VPT, 2014.

REFERENCES :

4. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013
5. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Cloud Computing	IT -6041(C)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the concepts, characteristics, delivery models and benefits of cloud computing

CO2 Understand the key security and compliance challenges of cloud computing

CO3 Understand the key technical and organisational challenges

CO4 Understand the different characteristics of public, private and hybrid cloud deployment models.

Course Contents:

UNIT-I

INTRODUCTION : Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments .Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking.

UNIT-II

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance,
Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management.
Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure

UNI- III

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

UNIT-IV

Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

UNIT-V

Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization &Definition, Cloud Federation Stack, Third Party Cloud Services.
Case study: Google App Engine, Microsoft Azure, Hadoop , Amazon , Aneka

TEXT BOOKS:

1. 1 Buyya, Selvi ," Mastering Cloud Computing ",TMH Pub
2. Kumar Saurabh, "Cloud Computing" , Wiley Pub
3. Krutz , Vines, "Cloud Security " , Wiley Pub
4. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub
5. Sosinsky, " Cloud Computing" , Wiley Pub

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Data Analytics Lab**	**IT -6051**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the basics of software as a product..

CO2 List the components of Hadoop and Hadoop Eco-System

CO3 Access and Process Data on Distributed File System

CO4 Manage Job Execution in Hadoop Environment

CO5 Develop Big Data Solutions using Hadoop Eco System

Course Contents:

Unit-I

Basics of data analytic framework, data per-processing, Statistics, probability, Probability Distribution, Bayes' Theorem, Central Limit theorem, Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers, Data visualization.

Unit-II

Introduction to R as a data analytics tool.

Unit -III

Introduction to MATLAB as a data analytics tool.

Unit -IV

Introduction to python as a data analytics tool.

Unit – V

Case studies.

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B.E. (Information Technology)

Third Year-Semester – VI

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Skill Development Lab**	**IT -6061**	**0L-0T-2P**	**2**

Course Outcomes:

CO1 Understand the basics of software as a Product.

CO2 Understand the current requirements of industries

CO3 Implement the software as a product using different design patterns.

CO4 Apply the software development techniques in real life applications.

After completing this course satisfactorily, a student will be able to:

Course Contents:

Unit-I

Software product life cycle.

Unit-II

Software product development standards.

Unit-III

Design patterns – 1

Unit-IV

Design Patterns – II

Unit-V

Case Study

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Soft Computing**	**IT -7011**	**3L-1T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand concept of ANN and explain the XOR problem

CO2 Use supervised neural networks to classify given inputs

CO3 Understand unsupervised neural networks for clustering data .

CO4 Build Fuzzy inference system using concepts of fuzzy logic.

Course Contents:

Unit-I

Introduction to Neural Network: Concept, biological neural network, comparison of ANN with biological NN, evolution of artificial neural network, Basic models, Types of learning, Linear separability, XOR problem, McCulloch-Pitts neuron model, Hebb rule.

Unit --II

Supervised Learning: Perceptron learning, Single layer/multilayer, Adaline, Madaline, Back propagation network, RBFN, Application of Neural network in forecasting, data compression and image compression.

Unit-III

Unsupervised learning: Introduction, Fixed weight competitive nets, Kohonen SOM, Counter Propagation networks, (Theory, Architecture, Flow Chart, Training Algorithm and applications). Introduction to Convolutional neural networks (CNN) and Recurrent neural networks (RNN).

Unit-IV

Fuzzy Set: Introduction, Basic Definition and Terminology, Properties and Set-theoretic Operations, Fuzzy Relations , Membership Functions and their assignment, Fuzzy rules and fuzzy

Reasoning, Fuzzy if-then Rules, Fuzzy Inference Systems. Application of Fuzzy logic in solving engineering problems.

Unit-V

Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems like TSP (Travelling salesman problem), Network design routing. Introduction to Ant Colony optimization (ACO) and Particle swarm optimization (PSO).

References-

1. S.N. Shivnandam, "Principle of soft computing", Wiley.
2. S. Rajshekaran and G.A.V. Pai, "Neural Network , Fuzzy logic And Genetic Algorithm", PHI.
3. Jack M. Zurada, "Introduction to Artificial Neural Network System" JAico Publication.
4. Simon Haykins, "Neural Network- A Comprehensive Foudation"
5. Timothy J.Ross, "Fuzzy logic with Engineering Applications", McGraw-Hills 1.

Suggested List of Experiments-

1. Form a perceptron net for basic logic gates with binary input and output.
2. Using Adaline net, generate XOR function with bipolar inputs and targets.
3. Calculation of new weights for a Back propagation network, given the values of input pattern, output pattern, target output, learning rate and activation function.
4. Design fuzzy inference system for a given problem.
5. Maximize the function y =3x2 + 2 for some given values of x using Genetic algorithm.
6. Implement Travelling salesman problem using Genetic Algorithm.
7. Optimisation of problem like Job shop scheduling using Genetic algorithm

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Simulation & Modelling**	**IT -7021(A)**	**3L-1T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Define, describe and apply basic concepts related to modeling, identification and simulation

CO2 Classify various simulation models and give practical examples for each category.

CO3 Demonstrate the ability to apply knowledge of probability and statistics for *simulation & modeling*

CO4 Construct a model for a given set of data and motivate its validity.

Course Contents:

UNIT-1

Modeling & Simulation Concepts Modeling & Simulation Concepts: System Concepts, What is a Model? Type of Models, Modeling & Simulation, Continuous vs. Discrete System Simulation, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, Simulation vs. Monte- Carlo Simulation, Nature of Computer Modeling and Simulation, When to Use Simulation? Limitations of Simulation.

UNIT-II

Probability Concepts in Simulation Stochastic variables, Random numbers: Pseudo-random generators,Testing of Pseudo-random number generators, Generation of non-uniformly distributed random numbers,discrete and continuous random variables, and density and distributive functions. Study of few distributionssuch as Poisson, Normal, Uniform.

UNIT-III

Simulation of Continuous Systems Introduction, Differential equations, Pure Pursuit Problem, Simulation ofChemical Reaction, Autopilot Simulation and Simulation of other Continuous systems.

UNIT-II

Simulation of Discrete Systems Arrival patterns and service times, Simulation of Queuing System -Elementary idea about networks of Queuing with particular emphasis to computer system environment.

UNIT-V

Verification & Validation Design of simulation experiments and validation of simulation experiments
comparing model data units and real system data.
Simulation Language A brief introduction to important discrete and continuous languages such as GPSS
(Study & use of the language). Use of data base & AI techniques in the area of modeling and simulation.

Recommended Books:

1. Deo, Narsing "System Simulation with Digital Computers"
2. Gorden G, "System Simulation", Prentice Hall
3. Shridhar Bhai Trivedi, Kishore "Probability & Statistics with reliability Queuing, Computer Science
   Applications"
4. Payer, T.A., "Introduction to System Simulation", McGraw Hill
5. Reitman, J, "Computer Simulation Application", Wiley
6. Barnes B, "Modeling and Performance Measurement of Computer System
7. Spriet, WIA. "Computer Aided Modeling and Simulation (Academic Press)..

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Deep and Reinforcement Learning**	**IT -7021(B)**	**3L-1T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Describe in-depth about theories, models and algorithms in machine learning.

CO2 Compare and contrast different learning algorithms with parameters.

CO3 Examine the nature of a problem at hand and find the appropriate learning algorithms and it's parameters that can solve it efficiently enough.

CO4 Design and implement of deep and reinforcement learningapproaches for solving real-life problems.

Course Contents:

UNIT-I

History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Activation functions, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalue Decomposition. Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs, Encoder Decoder Models, Attention Mechanism, Attention overimages.

UNIT-II

Autoencoders and relation to PCA, Regularization in autoencoders, Denoisingautoencoders, Sparse autoencoders, Contractive autoencoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Batch Normalization, Instance Normalization, Group Normalization.

UNIT-III

Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Learning Vectorial Representations Of Words, Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Recent Trends in Deep Learning Architectures.

UNIT-IV

Introduction to reinforcement learning(RL), Bandit algorithms – UCB, PAC,Median Elimination, Policy Gradient, Full RL & MDPs, Bellman Optimality, Dynamic Programming - Value iteration, Policy iteration, and Q-learning & Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces, Function Approximation, Least Squares Methods

UNIT-V

ed Q-learning algorithms , Learning policies by imitating optimal controllers , DQN & Policy Gradient, Policy Gradient Algorithms for Full RL, Hierarchical RL,POMDPs, Actor-Critic Method, Inverse reinforcement learning, Maximum Entropy Deep Inverse Reinforcement Learning, Generative Adversarial Imitation Learning,Recent Trends in RL Architectures.

Text Books:

1. Deep Learning, An MIT Press book, Ian Goodfellow and YoshuaBengio and Aaron Courville
2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.
3. Reinforcement Learning: An Introduction, Sutton and Barto, 2nd Edition.
4. Reinforcement Learning: State-of-the-Art, Marco Wiering and Martijn van Otterlo, Eds

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Data Science	IT -7021(C)	3L-1T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications

CO2 Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

CO3 Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

CO4 Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques..

Course Contents:

UNIT-I

Conceptualization and summarization: Representation of data. Modeling of machine learning techniques. Application of big data computing technologies..

UNIT-II

Trivial data versus Big data: Representation learning. Publicly available datasets. Scalability and Scaling up techniques. Report writing using Latex..

UNIT-III

Big data computing environment: Modern data analytics technologies like Hadoop and MapReduce. Suitable programming languages like Python, Java and C. Big data friendly machine learning scikit-learn libraries. Software platforms like Matlab or R.

UNIT-IV

Machine learning techniques: Three phases of machine learning. types of learning. support vector machine. decision trees and random forests. deep learning..

UNIT-V

Scaling up machine learning: Dimensionality reduction techniques like principal component analysis and feature hashing. Online processing technique called stochastic gradient descent. Big data machine learning models.

Text Books:

1. RadhaShankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Secondedition
2. Seema Acharya, SubhashiniChellappan, " Big Data and Analytics", Wiley, Firstedition

Reference Books:

1. KaiHwang,Geoffrey C., Fox. Jack, J. Dongarra, “Distributed and Cloud Computing”, Elsevier, Firstedition
2. Michael Minelli, Michele Chambers, AmbigaDhiraj, “Big Data Big Analytics”,Wiley

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Cyber Laws and Forensics**	**IT -7031(A)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Become aware of various cyber crimes and cyber laws

CO2 Underline the need of digital forensic and role of digital evidences

CO3 Understand different types of digital evidences that can be presented to support investigations

CO4 List the methods to generate legal evidence and supporting investigation reports

CO5 Use various digital forensic tools

Course Contents:

UNIT-I

Introduction to cybercrime, definition, cyber crime and information security, classification of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian ITA 2000, a global perspective on cybercrime, Cyber offences: How criminals plan them, Tools and methods used in cyber crime, Need of cyber law, The Indian IT act, challenges to Indian law and cybercrime scenario in India, digital signature and Indian IT act, Amendments in the Indian IT act, cybercrime and punishment.

UNIT-II

Law and framework for information security, law for intellectual property rights(IPR), patent law, copy right law, Indian copyright act, privacy issue and law in Hong Kong, Japan, and Australia, data protection act in Europe, health insurance portability and accountability act of 1996(HIPAA), Gramm-leach-Bliley act of 999(GLAB), Sarbanes-Oxley(SOX), legal issue in data mining, building security into software/system development life cycle.

UNIT-III

Digital forensics Science, The need for computer forensics, Understanding computer forensics, computer forensics versus other related disciplines, A brief History of computer Forensics, Cyber forensics and digital evidence, Digital forensics lifecycle, chain of custody concept, Network forensics, Approaching a computer forensics investigation, setting up a computer forensics laboratory, Forensics and social networking sites, computer forensics from compliance perspective, challenges in computer forensics, forensics auditing, antiforensics.

UNIT-IV

Current Computer Forensics Tools, Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations.

UNIT-V

Forensics of hand held devices, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks ,Router Forensics. Cyber forensics tools and case studies**.**

Reference Books

1) The Indian Cyber law with Cyber glossary, Suresh T. Vishwanathan, New Delhi, Bhart Law House, 2000.
2) Law of Cyber Crimes and Information Technology Law, S.V. JogaRao, 2007.
3) Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.
4) Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Course Technology.
5) Angus M. Marshall, “Digital forensics: Digital evidence in criminal investigation”, John – Wiley and Sons,
   2008.

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Digital Image Processing**	**IT -7031(B)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Explain basic concepts of image processing
CO2	Have knowledge of techniques employed for the enhancement of images
CO3	Interpret image segmentation and representation techniques.

Course Contents:

UNIT-I

Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

UNIT-II

Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

UNIT-III

Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering. Image Restoration A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

UNIT-IV

Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. Image Segmentation Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

UNIT-V

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recognition Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

Text Books

1. R.C Gonzalez & Richard E Wood, "Digital Image Processing", Addison Wesley Publishing
2. Anil K Jain, "Fundamentals of Digital image processing". PHI.
3. Sonka, Hlavac, Boyle, "Digital image processing and computer vision", Cengag
4. B Chanda, D. Dutta Majumder, "Digital image Processing and Analysis", PHI.

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Component Based Technology**	**IT -7031(C)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Familiarization with Component Based Systems, their Purpose and Scope.
CO2	AnalyseSoftware Engineering Practices related to CBD.
CO3	Apply design Of Software Component Infrastructures

Course Contents:

UNIT-I

Component Definition: Definition of Software Component and its Elements. Component Models and Component Services: Concepts and Principles, COTS Myths and Other Lessons Learned in Component-Based Software Development, Roles for Component-Based Development, Common High Risk Mistakes in Component-Based Software Engineering, CBSE Success Factors: Integrating Architecture, Process, and Organization.

Software Engineering Practices: The Practice of Software Engineering, From Subroutines to Subsystems: Component-Based Software Development.

UNIT-II

The Design of Software Component Infrastructures: Software Components and the UML, Component Infrastructures: Placing Software Components in Context, Business Components, Components and Connectors: Catalysis Techniques for Defining Component Infrastructures, An Open Process for Component-Based Development, Designing Models of Modularity and Integration.

UNIT-III

The Management Of Component-Based Software Systems: Measurement and Metrics for Software Components, The Practical Reuse of Software Components, Selecting the Right COTS Software: Why Requirements are Important, Software Component Project Management Processes, The Trouble with Testing Software Components, configuration Management and Component Libraries, The Evolution, Maintenance and Management of Component-Based Systems.

UNIT-IV

Component Technologies: Overview of the CORBA Component Model, Transactional COM+: Designing Scalable Applications, The Enterprise JavaBeans Component Model, Choosing Between COM+, EJB, and CCM, Software Agents as Next Generation Software Components.

UNIT V

Legal and Regulatory: CBSE as a Unique Engineering Discipline, The Future of Software Components: Standards and Certification, Commercial Law Applicable to Component-Based Software, The Effects of UCITA on Software Component Development and Marketing, Future of CBSE.

Text Books/Reference Books

1. Addison Wilsey , Component-Based Development: Principles and Planning for Business Systems (2010)
2. Don Box, Dorling Kingsley, Essential COM (2006.)

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Data Science Lab**	**IT -7041**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 Understand the R Programming Language

CO2 Exposure on Solving of data science problems.

CO3 Understand The classification and Regression Model.

Course Contents:

LIST OF EXPERIMENTS	
Week-1	**R AS CALCULATOR APPLICATION**
a. Using with and without R objects on console b. Using mathematical functions on console c. Write an R script, to create R objects for calculator application and save in a specified location in disk	
Week-2	**DESCRIPTIVE STATISTICS IN R**
a. Write an R script to find basic descriptive statistics using summary b. Write an R script to find subset of dataset by using subset ()	
Week-3	**READING AND WRITING DIFFERENT TYPES OF DATASETS**
a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location. b. Reading Excel data sheet in R. c. Reading XML dataset in R.	
Week-4	**VISUALIZATIONS**
a. Find the data distributions using box and scatter plot. b. Find the outliers using plot. c. Plot the histogram, bar chart and pie chart on sample data	
Week-5	**CORRELATION AND COVARIANCE**
a. Find the correlation matrix. b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.	
Week-6	**REGRESSION MODEL**
Import a data from web storage. Name the dataset and now do Logistic Regression to find out	

relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS).	
Week-7	**MULTIPLE REGRESSION MODEL**
Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.	
Week-8	REGRESSION MODEL FOR PREDICTION
Apply regression Model techniques to predict the data on above dataset	
Week-9	CLASSIFICATION MODEL
a. Install relevant package for classification. b. Choose classifier for classification problem. c. Evaluate the performance of classifier.	
Week-10	CLUSTERING MODEL
a. Clustering algorithms for unsupervised classification. b. Plot the cluster data using R visualizations.	
Reference Books:	
Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Elsevier, 1st Edition, 2012	
Web References:	
1.http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/ 2.http://www.ats.ucla.edu/stat/r/dae/rreg.htm 3.http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html 4. http://www.ats.ucla.edu/stat/r/data/binary.csv	

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B.E. (Information Technology)

Fourth Year-Semester – VII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Case Tools Lab**	**IT -7051**	**0L-0T-2P**	**2**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Understand the R Programming Language
CO2	Exposure on Solving of data science problems
CO3	Understand The classification and Regression Model.

Course Contents:

WEEK-l	**I NTRODUCTION TO UML**
Study of UML.	
WEEK-2	**ONLINE PURCHASE SYSTEM**
Create a UML model for Online Purchase system.	
WEEK-3	**LIBRARY MANAGEMENT SYSTEM**
Create a UML model for Library Management system.	
WEEK-4	**E-TICKETING**
Create a UML model for E-TICKETING.	
WEEK-5	**QUIZ SYSTEM**
Create a UML model for Quiz system.	
WEEK-6	**STUDENT MARK ANALYZING SYSTEM**
Create a UML model for Student Mark Analyzing system.	
WEEK-7	**E-MAIL CLIENT SYSTEM**
Create a UML model for E-Mail Client system.	
WEEK-8	**TELEPHONE PHONE DIALING**
Create a UML model for Telephone phone Dialing.	
WEEK-9	**POINT OF SALE**
Create a UML model for Point of Sale.	
WEEK-10	**WORKING COMPANY**
Create a UML model for Working Company.	

WEEK-11	ATM TRANSACTIONS
Create a system to design Bank ATM Transactions and generate code by using MS-Access as back end and VB as front end.	
WEEK-12	**STUDENT MARK ANALYSIS**
Create a system to design Student Mark Analysis System and generate code by using MS-Access as back end and VB as front end.	

REFERENCE BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 2nd Edition, 2004.
2. Craig Larman, "Appliying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", Pearson Education, 3rd Edition, 2005.

WEB REFERENCES:

1. www.uml.org
2. www.holub.com/goodies/uml/
3. www.uml-diagrams.org/
4. https://www.utdallas.edu/.../UML.../Rumbaugh--UML_2.0_Reference_C...

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B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Information Security**	**IT -8011**	**3L-1T-2P**	**6**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Understand key terms and concepts in information security and Cryptography and evaluate the cyber security needs of an organization.
CO2	Acquire knowledge to secure computer systems, protect personal data, and secure computer networks in an organization
CO3	Design operational and strategic information security strategies and policies.

Course Contents:

UNIT-I

Introduction: Fundamental Principles of Information Security- Confidentiality, Availability, Integrity, Non Repudiation, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, a Model for Network Security; Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

UNIT-II

Block Ciphers and Data Encryption Algorithm: Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and linear cryptanalysis, Block Cipher Design Principles; Advanced Encryption Standard: Evaluation criteria of AES, The AES Cipher, Multiple Encryption and Triple DES, Block Cipher modes of operation, Stream Ciphers, Confidentiality using Symmetric Encryption.

UNIT-III

Public Key Encryption: Principles of Public Key Cryptosystems, The RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic curve cryptography; Message Authentication and Hash Functions: Authentication requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs; Hash and MAC algorithms: Secure Hash Algorithm, HMAC; Digital Signatures and Authentication Protocols, Digital Signature Standard.

UNIT-IV

Authentication Applications, Kerberos, X.509 Authentication Service, Public key infrastructure; Electronic Mail Security: Pretty Good Privacy; IP Security: IP Security Overview, Architecture,

Authentication header, encapsulating security payload, Key management; Web Security: Web security considerations, Secure Socket Layer and Transport layer Security, Secure Electronic Transaction.

UNIT-V

System Security: Intruders, Intrusion Detection, Password management; Malicious Software: Different type of malicious software, Viruses and related threats, Virus Countermeasures, Threats and attacks on Information Security, DoS and DDos Attacks; Security controls required for Information Security, Firewalls: Firewall design principles, Trusted Systems, Common criteria for information technology security evaluation.

References:

1. William Stallings, "Cryptography and Network Security", Fourth edition, PHI
2. Atul Kahate, “Cryptography and Network Security”, McGraw Hill.
3. V.K. Pachghare, “Cryptography and Information Security”, PHI Learning
4. Nina Godbole, “Information System Security”, Wiley

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B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Engineering Economics & Management**	**IT -8021(A)**	**3L-1T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 To impart knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

CO2 To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management, various organizational structures and basic knowledge of marketing.

Course Contents:

UNIT-I

Introduction to Economics; Definitions, Nature, Scope, Difference etween Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity

UNIT-II

Theory of production; production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical.

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UNIT-III

Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly) National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income.

UNIT-IV

Basic economic problems; Poverty-meaning, absolute & relative poverty, causes, measures to reduce Unemployment: meaning, types, causes, remedies Inflation; meaning, types, causes, measures to control

UNIT-V

Introduction to Management; Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory

.

Reference Books:

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad
5. Principles of Management by Tripathy and Reddy
6. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications

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B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Machine Learning**	**IT -8021(B)**	**3L-1T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Recognize the characteristics of machine learning strategies.
CO2	Apply various supervised learning methods to appropriate problems.
CO3	Identify and integrate more than one technique to enhance the performance of learning.
CO4	Create probabilistic and unsupervised learning models for handling unknown pattern.

Course Contents:

UNIT-I

Introduction:

Introduction, Examples of various Learning Paradigms, Perspectives and Issues, Concept Learning, Version Spaces, Finite and Infinite Hypothesis Spaces, PAC Learning, VC Dimension

UNIT-II

Supervised Learning Algorithms:

Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification, Decision Trees: ID3, Classification and Regression Trees (CART), Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and NonLinear, Kernel Functions, K-Nearest Neighbors

UNIT-III

Ensemble Learning:

Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking

UNIT-IV

Unsupervised Learning:

Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, KMode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models, Principal Component Analysis (PCA), Locally Linear Embedding (LLE), Factor Analysis

UNIT-V

Probabilistic Learning:

Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks, Mining Frequent Patterns

References:

1. EthemAlpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014.
2. MehryarMohri, AfshinRostamizadeh, AmeetTalwalkar "Foundations of Machine Learning", MIT Press, 2012.
3. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition,1997.
4. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014.
5. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", 2nd Edition, CRC Press, 2015.
6. Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012
7. Jiawei Han and MichelineKambers and Jian Pei, "Data Mining –Concepts and Techniques", 3rd Edition,Morgan Kaufman Publications, 2012.
8. Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, "Mathematics for Machine Learning", Cambridge University Press, 2019.

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B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Robotics**	**IT -8021(C)**	**3L-1T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Understand robot mechanism
CO2	Perform kinematic and dynamic analyses with simulation
CO3	Design control laws for a robot
CO4	Integrate mechanical and electrical hardware for a real prototype of robotic device

Course Contents:

UNIT-I

Introduction to Robotics: Types and components of a robot, Classification of robots, closed-loop and open-loop control
systems; Kinematics systems: Definition of mechanisms and manipulators, Social issues and safety

UNIT-II

Robot Kinematics and Dynamics: Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH arameters, Jacobian, Singularity, and Statics; Dynamic Modelling: Equations of motion: Euler-Lagrange formulation

UNIT-III

Sensors and Vision System: Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc. Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/Similarity/Affine/Projective transformations, Vision applications in robotics.

UNIT-IV

Robot Control: Basics of control: Transfer functions, Control laws: P, PD, PID, Non-linear and advanced controls
Robot Actuation Systems: Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.

UNIT-V

Control Hardware and Interfacing: Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications

References:

1. Saha, S.K., “Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.
2. Ghosal, A., “Robotics”, Oxford, New Delhi, 2006.
3. Niku Saeed B., “Introduction to Robotics: Analysis, Systems, Applications”, PHI, New Delhi.
4. Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.
5. Mukherjee S., “Robotics and Automation”, Khanna Publishing House, Delhi.
6. Craig, J.J., “Introduction to Robotics: Mechanics and Control”, Pearson, New Delhi, 2009
7. Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, “Robot Modelling and Control”, John Wiley and Sons Inc, 2005
8. Steve Heath, “Embedded System Design”, 2nd Edition, Newnes, Burlington, 2003
9. Merzouki R., Samantaray A.K., Phathak P.M. and Bouamama B. Ould, “Intelligent Mechatronic System: Modeling, Control and Diagnosis”, Springer.

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Parallel Computing	IT -8031(A)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 To develop an understanding of various basic concepts associated with parallel computing environments

CO2 Understand, appreciate and apply parallel and distributed algorithms in problem solving

CO3 Acquire skills to measure the performance of parallel and distributed programs

CO4 Design parallel programs to enhance machine performance in parallel hardware environment

CO5 Design and implement parallel programs in modern environments such as CUDA, OpenMP, etc

Course Contents:

UNIT-I

Introduction: The need for parallelism, Forms of parallelism (SISD, SIMD, MISD, MIMD), Moore's Law and Multi-cores, Fundamentals of Parallel Computers, Communication architecture, Message passing architecture, Data parallel architecture, Dataflow architecture, Systolic architecture, Performance Issues.

UNIT-II

Large Cache Design: Shared vs. Private Caches, Centralized vs. Distributed Shared Caches, Snooping-based cache coherence protocol, directory-based cache coherence protocol, Uniform Cache Access, Non-Uniform Cache Access, D-NUCA, S-NUCA, Inclusion, Exclusion, Difference between transaction and transactional memory, STM, HTM

UNIT-III

Graphics Processing Unit: GPUs as Parallel Computers, Architecture of a modern GPU, Evolution of Graphics Pipelines, GPGPUs, Scalable GPUs, Architectural characteristics of Future Systems, Implication of Technology and Architecture for users, Vector addition, Applications of GPU

UNIT-IV

Introduction to Parallel Programming: Strategies, Mechanism, Performance theory, Parallel Programming Patterns: Nesting pattern, Parallel Control Pattern, Parallel Data Management, Map:

Scaled Vector, Mandelbrot, Collative: Reduce, Fusing Map and Reduce, Scan, Fusing Map and Scan, Data Recognition: Gather, Scatter, Pack , Stencil and Recurrence, Fork-Join, Pipeline

UNIT-V

Parallel Programming Languages: Distributed Memory Programming with MPI: trapezoidal rule in MPI, I/O handling, MPI derived datatype, Collective Communication, Shared Memory Programming with Pthreads: Conditional Variables, read-write locks, Cache handling, Shared memory programming with Open MP: Parallel for directives, scheduling loops, Thread Safety, CUDA: Parallel programming in CUDA C, Thread management, Constant memory and Event, Graphics Interoperability, Atomics, Streams

Reference Books

1. D. E. Culler, J. P. Singh, and A. Gupta, “Parallel Computer Architecture”, MorganKaufmann, 2004
2. Rajeev Balasubramonian, Norman P. Jouppi, and Naveen Muralimanohar, “Multi-Core Cache Hierarchies”, Morgan & Claypool Publishers, 2011
3. Peter and Pach Eco, “An Introduction to Parallel Programming”, Elsevier, 2011
4. James R. Larus and Ravi Rajwar, “Transactional Memory”, Morgan & Claypool Publishers, 2007
5. David B. Kirk, Wen-mei W. Hwu, “Programming Massively Parallel Processors: A Hands-on Approach”, 2010
6. Barbara Chapman, F. Desprez, Gerhard R. Joubert, Alain Lichnewsky, Frans Peters “Parallel Computing: From Multicores and GPU's to Petascale”, 2010
7. Michael McCool, James Reinders, Arch Robison, “Structured Parallel Programming: Patterns for Efficient Computation”, 2012
8. Jason Sanders, Edward Kandrot, “CUDA by Example: An Introduction to GeneralPurpose GPU Programming”, 2011

R.K.D.F. UNIVERSITY, BHOPAL

B.E. (Information Technology)

Fourth Year-Semester – VIII

Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	Game Theory with Engineering Applications	IT -8031(B)	4L-0T-0P	4

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1 formulate mathematically multi-agent decision-making problems arising in engineering applications as games

CO2 analyze using mathematical theory the equilibria of the games and compute them using optimization theory, analyze mathematically the outcome of the game.

CO3 Understand selected models and concepts of game theory

CO4 Produce simple economic models with basic game theory

Course Contents:

UNIT-I

Overview: What is a Game, Game Design Schema, Game Design fundamentals, Engineering application of game theory, Design Process: Iterative design, Commissions, Design & Testing of the Board Game, Introduction to meaningful play, two kinds of meaningful play- discernable & integrated.

UNIT-II

Introducing design, design & meaning, Semiotics: A brief overview, four semiotic Concepts, Context Shapes interpretations.

UNIT-III

Introduction to Systems, elements of a System, Framing Systems, open & closed systems, Introduction to Interactivity, a multivalent model of interactivity, interaction & choice, choice molecules, anatomy of choice, space of possibility.

UNIT-IV

Defining games: overview of digital games, magic circle. Primary Schemas: conceptual framework, rule, play, culture.

UNIT-V

Rules: defining rules, a deck of cards, quality of rules, rules in context, Rules on three levels: Operational, Constituative, Implicit, Identity of a Game, Specificity of Rules, Rules of Digital games. Case Studies: Tic Tac Toe, Deck of Cards.

TEXT BOOKS:-

1. Brathwaite, Brenda, and Ian Schreiber. Challenges for Game Designers: Non-digital Exercises for Video Game Designers. Boston, MA: Charles River Media/Course Technology, 2009. ISBN: 97815845058081
2. Game Design Workshop: A Playcentric Approach to Creating Innovative Games by Tracy Fullerton. ISBN-10: 1482217163.
3. Challenges for Game Designers by Brenda Brathwaite (now: Romero) and Ian Schreiber. ISBN-10: 158450580X

REFERENCE BOOKS:-

1. Rules of Play - Game Design Fundamentals, Katie Salen and Eric Zimmerman, The MIT Press Cambridge, Massachusetts London, England, book design and photography.

Fourth Year-Semester – VIII
Course Content

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
B.E. (IT)	**Block Chain Technologyy**	**IT -8031(C)**	**4L-0T-0P**	**4**

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1	Understand block chain technology
CO2	Acquire knowledge of crytocurrencies
CO3	Develop block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks

Course Contents:

UNIT-I

Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Cryptocurrency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain; Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

UNIT-II

Understanding Block chain with Crypto currency: Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, HashCash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool

UNIT-III

Understanding Block chain for Enterprises: Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT-IV

Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, and Identity on Block chain

UNIT-I

Block chain application development: Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda

References:

1. Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
2. Josh Thompsons, "Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming"
3. Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
4. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
5.Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
6. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
7. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized Applications with Hyperledger Fabric and Composer", Import, 2018