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Mukesh Patel School of Technology Management and Engineering

Program B Tech All programs [except CSBS and CSE(DS) 311 (VT)] MBA Tech Computer / B Tech Integrated Mechanical and Computer / B Tech Integrated IT				**Semester** III / IV / VII / VIII	
Course Probability and Statistics				**Module Code** 702BS0C034	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite Nil

Course Objective

This course aims to instill in students a sound knowledge of probability theory and statistical techniques. It equips the students with intermediate to advanced level concepts and tools in probability and statistics that help them tackle relevant problems within engineering domain.

Course Outcomes

After completion of the course, students will be able to -

1. Solve problems involving random variables, probability distributions and testing of hypothesis, correlation and regression
2. Identify suitable probability distribution and testing techniques to solve related problems
3. Apply knowledge of random variables, probability distributions, measures of central tendency, correlation and regression to solve real life problems
4. Analyse data samples using statistical methods

Detailed Syllabus

Unit	Description	Duration
1	**Basic Probability** Probability spaces, conditional probability, independence; Bayes theorem.	03
2	**Random variables and Probability Distributions** Discrete random variables, probability mass function, cumulative distribution function, Independent random variables, Continuous random variables, distribution functions and densities, expectation, variance, raw and central moments of random variables, Binomial distribution, Poisson approximation to the binomial distribution, Normal distribution.	06
3	**Bivariate Distributions** Definition of Bivariate Distribution and their properties, Conditional densities.	02
4	**Basic Statistics** Measures of Central tendency; Moments, Moment generating function, skewness, kurtosis. Mean and variance of Binomial distribution & Poisson distribution, Moments, skewness & kurtosis for Normal distribution.	02

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5	**Testing of hypothesis** Point estimation, Interval estimate and Confidence interval, Criteria for good estimates, Null and Alternate hypothesis, Test Statistic, Type I and Type II errors, One-tailed and two-tailed test, Critical region, Large sample statistical test for mean, Large sample statistical test for proportion, t-test for small samples, Test for variance- F test, Chi-square test for Goodness of fit and independence of attributes, Analysis of variance.	**12**
6	**Linear Statistical Models** Scatter diagram, Linear regression and correlation, Least squares method, Rank correlation, Multiple regression.	**05**
	Total	**30**

Text Books

1. Veerarajan T, *Probability, Statistics and Random Processes*, McGraw hill Education, 4th Edition, 2017.
2. S. Ross , *A First Course in Probability*, Pearson Education India, 9th Edition, 2013.

Reference Books

1. W. Feller, *An Introduction to Probability Theory and its Applications*, Vol. 1, John Wiley & Sons, 3rd Edition, 2017.
2. Devore, *Probability and Statistics for Engineering and Sciences*, Cengage Learning, 2nd Indian Edition, 2009.
3. Irwin Miller, John E. Freund and R. A. Johnson, *Probability & Statistics for Enginees*, Pearson Education India, 8th Edition, 2015.
4. S. C. Gupta, V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, 12th Edition, 2014.
5. Murray R. Spiegel, John J. Schiller, R. Alu Srinivasn, *Probability and Statistics*, McGraw Hill Education, 4th Edition, 2013.

Laboratory Work

8 to 10 experiments based on the syllabus.

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Program: B Tech /MBA Tech (Computer Engineering, IT, Artificial Intelligence), B Tech (AI and DS, AI and ML, CSBS, Cyber Security, Computer Science) BTI Computer/ B Tech Integrated IT				**Semester:** III/ IV/ V/ IX / VIII	
Course: Operating Systems				**Code**: 702CO1C002	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (marks -50)**	**Term End Examinations (TEE) (marks -100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Programming, Computer Organization and Architecture, Data Structures and Algorithms

Course Objective

The objective of this course is to provide an introduction to functions of the computer operating system.

Course Outcomes

After completion of the course, students will be able to -

1. Describe the fundamental concepts of Operating system
2. Apply process management strategies
3. Simulate memory management, I/O management and file management strategies.

Detailed Syllabus

Unit	Description	Duration
1	**Operating System Overview:** Operating system objectives and functions, evolution of operating system, basic concepts: Processes, Files, System Calls, Layered structure v/s Monolithic structure of OS	**02**
2	**Process and Process Scheduling:** Process Description, Process Control Block (PCB), Threads, Thread management, comparison between Processes and threads, Process Scheduling: Types, study and comparison of various scheduling algorithms	**06**
3	**Process Concurrency:** Principles of Concurrency, Mutual Exclusion-Hardware Approaches, Semaphores, Monitors, Message Passing, Classical IPC Problems: Reader's / Writer's Problem, Producer / Consumer Problem	**06**
4	**Deadlock:** Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery, Dining Philosopher Problem	**05**

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5	**Memory Management:** Memory Management Requirements, Memory Partitioning, Paging, Segmentation, Page Replacement algorithms	**06**
6	**I/O Management and Disk Scheduling:** I/O devices, organization of I/O function, I/O buffering, Disk structure, Disk scheduling algorithms	**03**
7	**File Management:** Overview, File Organization, File Directories, File Sharing	**02**
	Total	**30**

Text Books

1. Silberschatz A. Galvin, *Operating Systems Principles*, 10th Ed., Global Editions, 2023.
2. William Stallings, *Operating Systems: Internals and Design Principles*, 9th Edition, Pearson Education, 2018.

Reference Books

1. Andrew S. Tannenbaum, *Modern Operating System*, 4th Edition, Pearson Education, 2016.

Laboratory Work:

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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Program: B Tech and MBA Tech IT/ B Tech CSE (Cybersecurity)/B Tech Integrated (IT)				**Semester:** IV/VIII	
Course: Object Oriented Programming				**Code:** 702IT0C021	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Practical examination Marks Scaled to 50

Pre-requisite: Programming for Problem Solving

Course Objective

To introduce object-oriented programming paradigm to solve business problems.

To understand and differentiate between object-oriented programming and procedural programming

Course Outcomes

After completion of the course, the student will be able to -

1. Explain and implement the basic concepts in Java such as defining classes, creating objects, invoking methods, handling exceptions etc
2. Design solutions for a given problem using the concepts of Abstraction, Polymorphism, Encapsulation, Inheritance in OOP paradigm
3. Design Class diagrams for solving a real-world problem

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Review of Object Orientation, Class and Objects, Primitive Object types.	4
2	**Strings and Arrays** Strings, String buffer, Arrays, Vectors, Operators, Loop Control, Decision Making	4
3	**Object Oriented Systems** Encapsulation, Constructors, Inheritance, Polymorphism (Overloading, Over riding),	6
4	**Modelling Classes** UML Class Diagram, Associations and multiplicity, Generalization. Process of developing class diagrams, Implementing class diagrams in Object Oriented Programming Language.	4
5	**Exception Handling** Pre defined Exceptions, Try-Catch-Finally, Throws, throw, User Defined Exception.	3
6	**IO Streams** Byte-oriented streams, Character – oriented streams, File handling	4
7	**Abstract Class, Interfaces** Abstract Classes, Interface, Inner classes, Wrapper Classes	5

	Total	**30**

Text Books

1. Y. Daniel Liang, *Introduction to Java Programming, Comprehensive Version*, Global Edition, 11th Edition, Pearson Education, 2019.
2. Herbert Schildt, *Java 2: The Complete Reference*, 5th Edition , McGraw-Hill Education, 2017.
3. Cay S. Horstmann, *Core Java Volume I – Fundamentals*, 11th Edition, Pearson, 2018

Reference Books

1. Herbert Schildt, *Java: A Beginner's Guide*, 8th Edition, McGraw-Hill Education, 2018.
2. Joshua Bloch, *Effective Java*, 3rd Edition, Addison Wesley, 2017.

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

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Signature

(Head of the Department)

Program: B Tech and MBA Tech IT/ B Tech Integrated (IT)				**Semester:** IV/VIII	
Course : Principles of Artificial Intelligence				**Code:** 702IT0C004	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Computer Programming and Data Structures.

Course Objective

To provide a strong foundation of fundamental concepts in Artificial Intelligence and to enable the student to apply these techniques in applications, which involve perception, reasoning and learning.

Course Outcomes

After completion of the course, the student will be able to –

1. Explain the history & basic principles of AI in solutions that require problem solving
2. Discuss knowledge representation and apply learning techniques like Neural networks, Bayesian networks etc. in various AI problems
3. Analyze and design a real-world problem for implementation of NLP methods

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Overview and historical perspective, Turing test, physical symbol systems and the scope of symbolic AI, agents & its types	3
2	**Problem Solving** Problem spaces (states, goals and operators), problem solving by search, uninformed search (breadth-first, depth-first, depth-first with iterative deepening), heuristics and informed search (hill-climbing, generic best first, A*, AO*), minimax search, alpha-beta pruning, two-player games (introduction to minimax search), constraint satisfaction (backtracking and local search methods).	8
3	**Knowledge and Reasoning** Building a knowledge base, propositional logic, first order logic, resolution and theorem proving.	6
4	**Learning** Overview of different forms of learning, learning decision trees, probabilistic learning Bayesian networks, neural networks and SVMs.	7
5	**Introduction to Natural Language Processing** Language models, n-grams, vector space models, bag of words, text classification, information retrieval, PageRank, information extraction, question answering.	6
	Total	**30**

Text Books

1. Dan W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, 1st Edition, Pearson Education, 2015.

2. Stuart Russel and Peter Norvig, *Artificial Intelligence A Modern Approach*, 4th Edition, Pearson Education, 2010.

Reference Books

1. Elaine Rich, Kevin Knigh and Shivashankar B Nair , *Artificial Intelligence*, 3rd Edition, Tata McGraw Hill, 2017.

Laboratory Work

8 to 10 Programming exercises (and a practicum) based on the syllabus.

Signature
(Head of the Department)

Program: B Tech and MBA Tech IT/ B Tech Integrated (IT)				**Semester:** IV/VIII	
Course: Programming for Analytics				**Code:** 702IT0C022	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
1	2	0	2	Marks Scaled to 50	Practical examination Marks Scaled to 50

Pre-requisite: Programming for Problem Solving.

Course Objective

To build basic programming skills required for Analytics including techniques for processing, controlling, and manipulating data sets.

Course Outcomes

After completion of the course, the student will be able to –

1. Create data sets suitable for analysis
2. Generate summary reports
3. Access and manipulate data stored in excel or raw data files
4. Perform data transformations and iterative data processing

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Defining Data Analysis, Identifying Data for Analysis Modern Data Ecosystem, Understanding Different Types of File Formats, Sources of Data, Overview of Data Repositories, Data Wrangling and tools used.	**2**
2	**Accessing Data and producing detail reports** Examining data sets, Sub-setting, sorting, grouping report data and producing enhancing reports.	**3**
3	**Reading Data Sets** Reading and customizing a data set. Introduction to reading raw data files, reading standard delimited data and handling missing data. Reading spreadsheet data, database data.	**3**
4	**Manipulating Data** Using functions, conditional processing (If and DO loop) & Performing operations using arrays. **Combining Data Sets:** Concatenating data sets, merging data sets one-to-one, merging data sets one-to-many, and merging data sets with no matches. Analyzing data sets and creating summary reports using various data mining techniques.	**4**
5	**Data Transformations** Manipulating character variables, manipulating numeric variables, manipulating numeric variables based on dates, converting variable type and using various Debugging Techniques	**3**
	Total	**15**

Text Books

1. Albright S.C., *Business Analytics: Data Analysis & Decision Making*, 7th Edition, Cengage Publication, 2020.
2. Lora D Delwiche, *The Little SAS Book: A Primer*, 6th Edition, SAS Institute, 2019.

Reference Books

1. Ron Cody, *Learning SAS by Example: A Programmers Guide*, 2nd Edition, SAS Institute, 2018.
2. Charles R. Severance, *Python for Everybody: Exploring Data in Python 3*, 3rd Edition, Amazon Digital Services, 2016.
3. Garrett Grolemund, *R for data science: Import, Tidy, Transform, Visualize, And Model Data*, 1st Edition, O'Reilly publication, 2017.

Laboratory Work

- 8 to 10 Programming exercises (and a practicum) based on the syllabus.

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Signature

(Head of the Department)

Program: B Tech and MBA Tech IT/ B Tech CSE (Cybersecurity)/B Tech Integrated (IT)				**Semester: IV/VIII**	
Course: Data Warehousing and Mining				**Code:** 702IT0C012	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Programming for Problem Solving, Data Base Management Systems, Data Structures and Algorithms

Course Objective

The course is designed to enable students to be familiar with the concepts of data warehouse and data mining. The data warehousing part of module aims to give students an overview of the ideas and techniques, which are behind recent development in the data warehousing and online analytical processing (OLAP) fields. Data mining part of the module aims to develop skills of using recent data mining software for solving practical problems.

Course Outcomes

After completion of the course, the student will be able to -

1. Understand the fundamentals of Data Warehouse, Data Mining and their importance in providing solutions to real world problems
2. Understand ETL, analytical processing and information delivery in data warehouse
3. Select and implement appropriate data mining algorithms for solving practical problems

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Need for Data warehousing, basic elements of DW and trends in DW, Project planning and management, collecting the requirements.	3
2	**Architecture and Infrastructure & Data Representation** Architectural components, infrastructure and metadata, Principles of dimensional modeling, dimensional modeling advance topics, data extraction, transformation and loading	6
3	**Information access and delivery** Matching information to classes of users, OLAP in data warehousing	6
4	**Introduction to Data Mining** Basics of data mining, related concepts, data mining techniques, Classification, clustering, association rules, KDD Process.	2
5	**Classification** Issues in Classification, Statistical Based, Distance-Based and Decision-Based classification	5
6	**Clustering and Association Rules** Hierarchical and Partitional Algorithms. Basic Association Rule Algorithms	4
7	**Applications and Advanced Topics in Data Mining**	4

	Applications, systems products and research prototypes, additional themes in data mining, trends in data mining. Introduction to Web Mining and Spatial Mining	
	Total	**30**

Text Books

1. Margaret Dunham, *Data mining: Introductory and Advanced Topics*, 1st Edition, Pearson Education, 2008.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, *Introduction to data mining*, 10 July Edition, Pearson Education, 2016.
3. Paulraj Ponnian, *Data warehousing: Fundamentals IT Professionals*, 2nd Edition, John Wiley India Pvt. Ltd., 2012.

Reference Books

1. Jiawei Han and Micheline Kamber, *Data Mining Concepts and Techniques*, 3rd Edition, Morgan Kauffmann, 2011.
2. Alex Berson and Stephen J.Smith, *Data Warehousing, Data Mining & OLAP*‖, 35th Reprint ,Tata McGraw – Hill, 2016.

Laboratory/Tutorial Work

8 to 10 Programming exercises (and a practicum) /Tutorial exercises based on the syllabus.

Signature
(Head of the Department)

Program: B Tech /MBA Tech (Computer Engineering /IT) B Tech (AI & ML, Cyber Security, CSBS) BTI Computer Engineering and Information Technology				**Semester:** IV/III/VIII	
Course: Computer Organization and Architecture				**Code:** 702CO0C023	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**	**Term End Examinations (TEE) (Marks- 100)**
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: NA

Course Objective

To provide knowledge of the basic principles of the organization, operation and performance of modern day computer systems and the underlying semiconductor circuit architectures used to construct parallel computer components.

Course Outcomes: After completion of the course, student will be able to -

1. Discuss the functional blocks of computers and the interconnections
2. Evaluate the memory system
3. Explain the components of the Central Processing Unit
4. Describe Input Output and Parallel Organization

Detailed Syllabus

Unit	Description	Duration
1	**Overview** General Organization and architecture, Structural/functional view of a computer, Computer Functional Components.	**03**
2	**System Buses** Overview of basic instruction cycle, Interrupts, Bus interconnection, Elements of bus design, Read and write timings diagram, Bus hierarchy, Bus arbitration techniques.	**06**
3	**Memory Organization** Internal Memory- Memory characteristics and memory hierarchy. Cache Memory**-** Elements of cache design, Address mapping and Translation-Direct mapping, Address mapping and translation- Associative mapping, Address mapping and translation -Set associative mapping, Performance characteristics of two level memory, Semiconductor main memory- Types of RAM, DRAM and SRAM, Chip logic, Memory module	**10**

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	organization. High speed memories- Associative memory, High speed memories- Interleaved memory.	
4	**Data path Design** IEEE 754 data format, IEEE 754 data format numerical, Design of serial and parallel adder and subtractor, Booth's algorithm, ALU -Combinational and sequential ALU. Block diagrams of high speed adders multipliers, Block diagrams of high speed multipliers, Overview of math coprocessor.	**09**
5	**Central Processing Unit** Basic Instruction Cycle and Instruction set, Formats and addressing, Processor Organization and Register Organization, Instruction Pipelining, Co-processors, Pipeline processors, RISC and CISC computers.	**06**
6	**Control Unit and Peripheral Devices** Control Unit- Micro Operations, Hardwired Implementations, Micro Programmed control, Micro instruction format and applications of microprogramming, I/O modules- Programmed I/O, I/O modules-Interrupt Driven I/O, DMA.I/O processors and channels, General-Purpose Graphics Processing Unit, GPU applications, synchronization, coherence.	**09**
7	**Multiprocessor Processor Organizations** Flynn's classification of parallel processing Systems, Superscalar Processors.	**02**
	Total	**45**

Text Books

1. William Stallings, *Computer Organization and Architecture: Designing and Performance*, Prentice Hall, 11th Edition, Pearson Education, 2022.
2. John P. Hayes Mc-Graw Hill, *Computer Architecture and Organization*, 2nd Edition, 2010. ISBN-13 : 978-1259028564
3. Morris Mano, Computer System Architecture, PHI, 3rd Edition, Pearson Education, 2017.

Reference Books:

1. Andrew Tannenbaum, *Structured Computer Organization*, 6th Edition, PHI, Pearson Education, 2016.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig "*Computer Organization and Embedded Systems* " 6th Edition, 2023.

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Program : B Tech / MBA Tech / BTI				**Semester : II/III/IV/V/VIII**	
Course : Management Accounting for Engineers				**Code :**	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	0	0	2	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: NIL

Course Objective

The course provides a conceptual understanding of various aspects of cost accounting – cost ascertainment, cost analysis, and use information for managerial decision making

Course Outcomes

After completion of the course, the student will be able to -

1. Explain the concepts of financial, cost and management Accounting
2. Understand different types of costs and prepare a cost sheet of a product
3. Analyse the profitability and recommend a suitable decision
4. Calculate the various types of variances in costs
5. Build a flexible budget

Detailed Syllabus

Unit	Description	Duration
1	Introduction to Accounting, Importance of Accounting for Engineers, Users of Accounting Information, Financial Statements, Branches of Accounting, Limitations of Financial Accounting, Evolution of Cost and Management Accounting	4
2	Cost Accounting – Meaning and Definition – Need and Importance of Cost Accounting – Differences Between Financial Accounting and Cost Accounting and Management Accounting	2
3	Cost Concepts and Classifications	2
4	Material Control – Meaning, Objectives, Advantages, Techniques and Types of Material Control – ABC, VED,FSN,MRP,JIT, Material Levels and EOQ	4
5	Calculation of Cost and Preparation of Cost Sheet	5
6	Marginal Costing and Cost-Volume-Profit Analysis	5
7	Standard Costing and Variance Analysis – Material Variances – Cost, Price and Usage, Labour Variances – Cost, Rate and Efficiency	4
8	Budgeting – Meaning, Types of Budgets, Advantages of Budgeting, Preparation of Flexible Budget	4
	Total	**30**

Text Books

1. Lal. J., & Srivastava, S, "*Cost accounting*", 5th Edition, Tata McGraw Hill , New Delhi, 2013.

2. Ramanathan, S., "*Accounting for Management*", Latest Reprint Oxford University Press, New Delhi, 2014.

Reference Book

1. Horngren C. T., Sundem G. L., & Stratton W. O., "*Introduction to Management Accounting*",17th Edition, Pearson Educación, 2022.

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(Head of the Department)