SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: B. Tech. Computer Science and Business Systems				**Semester:** IV	
Course/Module: Operating Systems				**Module 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 in Question Paper)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite:

Objectives:

1. To enable students to understand the basic concepts of an Operating system
2. To strengthen the understanding of various algorithms related to the process, memory, I/O and file management through implementation

Outcomes: After completion of the course, students would be able to

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

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction**: Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.	**4**
2	**Processes**: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. **Thread**: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.	**5**
3	**Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time. **Scheduling algorithms**: Pre-emptive and non-pre-emptive, FCFS, SJF,	**7**

	RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.	
4	**Inter-process Communication**: Concurrent processes, precedence graphs, Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's Solution, The Producer / Consumer Problem, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, Barber's shop problem **Deadlocks**: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	**9**
5	**Concurrent Programming:** Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection and recovery.	**4**
6	**Memory Management**: Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction. **Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	**6**
7	**I/O Hardware**: I/O devices, Device controllers, Direct Memory Access, Principles of I/O. **File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.	**6**
8	**Disk Management**: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.	**2**
9	**Case study:** Comparison of Windows and UNIX, UNIX OS file system, shell, filters, shell programming, programming with the standard I/O, UNIX system calls.	**2**

	Total	**45**

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts Essentials", John Wiley & Sons, 2nd Edition, 2014.

Reference Books:

1. William Stallings, "Operating Systems: Internals and Design Principles", William Stallings, 9th Edition, 2018.
2. Charles Patrick Crowley, "Operating System: A Design-oriented Approach", McGraw Hill Education, 2017.
3. Gary J. Nutt., "Operating Systems: A Modern Perspective", Pearson, 3rd Edition, 2014.
4. Maurice J. Bach, "Design of the Unix Operating Systems", Pearson Education India, 2015.
5. Daniel Pierre Bovet, Marco Cesati, "Understanding the Linux Kernel", O'Reilly Media, Inc., 2002.

Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

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Signature **Signature**
(Prepared by Concerned Faculty/HOD) **(Approved by Dean)**

Program: B. Tech. Computer Science and Business Systems				**Semester:** IV	
Course/Module:	Database Management Systems			**Module 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 in Question Paper)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Data Structures, Computer Organization & Architecture

Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To model, design and build a simple database system.
3. To understand and use database query languages to access and manage a database.
4. To understand query processing and optimization.
5. To develop an understanding of essential DBMS concepts: Normalization, Transactions, concurrency Control, Storage strategies, database security and advance topics.

Outcomes: After Completion of the Course, students would be able to:

1. Understand the terminology, features, types, advantages and characteristics embodied in database systems.
2. Design database system architecture and data models
3. Formulate and solve problems using structure query languages with optimization
4. Understand indexing techniques, concurrency control techniques, database security advanced concepts.

Detailed Syllabus:

Unit	**Description**	**Duration**
1	**Introduction:** Introduction to Database. Hierarchical, Network and Relational Models.	3
2	**Database system architecture**: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).	3
3	**Data models**: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	6

4	**Relational query languages**: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.	6
5	**Relational database design**: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms, Dependency preservation, Lossless design.	5
6	**Query processing and optimization**: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	5
7	**Storage strategies**: Indices, B-trees, Hashing.	3
8	**Transaction processing**: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	6
9	**Database Security**: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	4
10	**Introduction to Advanced topics**: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining, Unstructured database, Dataswarm	4
	Total	**45**

Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", McGraw Hill Education, 6th Edition,2013

Reference Books:

1. J. D. Ullman, "*Principles of Database and Knowledge – Base Systems*", Vol 1 by Computer Science Press, 2016
2. R. Elmasri and S. Navathe, "*Fundamentals of Database Systems*.", Pearson Education, 7th Edition, 2017
3. Abiteboul, Richard Hull, Victor Vianu, "*Foundations of Databases*", Pearson Publication, 1994

Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

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Signature **Signature**
(Prepared by Concerned Faculty/HOD) **(Approved by Dean)**

Program: B. Tech. Computer Science and Business Systems				**Semester:** IV	
Course/Module: Software Design with UML				**Module 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 in Question Paper)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Fundamentals of Computer Science BTCS01003, Software Engineering BTCS03005

Objectives: To prepare students to apply Object Oriented Analysis and design Models in their Projects. The students are exposed to Coding, team work, Project Management. To prepare students to excel in working and designing their project, Succeed in industry. The Star UML tool is used to excel in the design of the project.

Outcomes: After successful completion of this course, students will be able to

1. Understand Unified process.
2. Elicit the Requirements using use case diagram for the given problem.
3. Design interaction, structural, and dynamic model for a given problem.
4. Design package, component and deployment model for the given problem.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to on Object Oriented Technologies and the UML Method:** Software development process: The Waterfall Model vs. The Spiral Model. The Software Crisis, description of the real world using the Objects Model. Classes, inheritance and multiple configurations. Quality software characteristics. Description of the Object Oriented Analysis process vs. the Structure Analysis Model.	5
2	**Introduction to the UML Language:** Standards. Elements of the language. General description of various models. The process of Object Oriented software development. Description of Design Patterns. Technological Description of Distributed Systems.	5
3	**Requirements Analysis Using Case Modeling:** Analysis of system requirements. Actor definitions. Writing a case goal. Use Case Diagrams. Use Case Relationships.	5

4	**Transfer from Analysis to Design in the Characterization Stage: Interaction Diagrams:** Description of goal. Defining UML Method, Operation, Object Interface, Class. Sequence Diagram. Finding objects from Flow of Events. Describing the process of finding objects using a Sequence Diagram. Describing the process of finding objects using a Collaboration Diagram	5
5	**The Logical View Design Stage: The Static Structure Diagrams:** The Class Diagram Model. Attributes descriptions. Operations descriptions. Connections descriptions in the Static Model. Association, Generalization, Aggregation, Dependency, Interfacing, Multiplicity	5
6	**Package Diagram Model:** Description of the model, White box, black box. Connections between packagers. Interfaces. Create Package Diagram. Drill Down.	5
7	**Dynamic Model: State Diagram / Activity Diagram:** Description of the State Diagram. Events Handling. Description of the Activity Diagram. Exercise in State Machines.	5
8	**Component Diagram Model:** Physical Aspect. Logical Aspect. Connections and Dependencies. User face. Initial DB design in a UML environment	5
9	**Deployment Model:** Processors. Connections. Components. Tasks. Threads. Signals and Events.	5
	Total	**45**

Text Books:

1. Bernd Bruegge and Allen H. Dutoit, "*Object-Oriented Software Engineering: using UML, Patterns, and Java*",3rd *edition, 2013.*

Reference Books:

1. Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides, "*Design Patterns: Elements of Reusable Object-Oriented Software*", 1995.

Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10

Class Test 2	10
Term Work	30
Total Marks :	**50**

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Signature **Signature**
(Prepared by Concerned Faculty/HOD) **(Approved by Dean)**

Program: B. Tech. Computer Science and Business Systems				**Semester:** IV	
Course/Module: Introduction to Innovation, IP Management & Entrepreneurship				**Module 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 in Question Paper)**
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Fundamentals of Computer Science BTCS01003, Software Engineering BTCS03005

Objectives: The major emphasis of the course will be on creating a learning system through which management students can enhance their innovation and creative thinking skills, acquaint themselves with the special challenges of starting new ventures and use IPR as an effective tool to protect their innovations and intangible assets from exploitation.

Outcomes: After successful completion of this course, students will be able to

1. Understand creative and innovative thinking styles
2. Understand, investigate and internalize the process of founding a startup
3. Manage various types of IPR to protect competitive advantage

Detailed Syllabus:

Unit	Description	Duration
1	**Innovation: What and Why?** Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations. Class Discussion- Is innovation manageable or just a random gambling activity?	5
2	**Building an Innovative Organization:** Creating new products and services, exploiting open innovation and collaboration, Use of innovation for starting a new venture Class Discussion- Innovation: Co-operating across networks vs. 'go-	8

	it-alone' approach	
3	**Entrepreneurship:** Opportunity recognition and entry strategies Entrepreneurship as a Style of Management, Maintaining Competitive Advantage- Use of IPR to protect Innovation	8
4	**Entrepreneurship- Financial Planning:** Financial Projections and Valuation, Stages of financing, Debt, Venture Capital and other forms of Financing.	8
5	**Intellectual Property Rights (IPR):** Introduction and the economics behind development of IPR: Business Perspective, IPR in India – Genesis and Development, International Context, Concept of IP Management, Use in marketing.	8
6	**Types of Intellectual Property:** Patent- Procedure, Licensing and Assignment, Infringement and Penalty, Trademark- Use in marketing, example of trademarks- Domain name, Geographical Indications- What is GI, Why protect them? Copyright- What is copyright, Industrial Designs- What is design? How to protect? Class Discussion- Major Court battles regarding violation of patents between corporate companies	8
	Total	**45**

Text Books:

1. Joe Tidd, John Bessant, "Managing Innovation: Integrating Technological, Market and Organizational Change", Wiley, 6th Edition, 2018

Reference Books:

1. Neeraj Pandey, Khushdeep Dharni, "Intellectual Property Rights", PHI Learning, 2014.

Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	Marks
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

Home Assignment:

Case study materials book will be given to students. Students are required to meet in groups before coming to class and prepare on the case for the day. Instructor may ask the student groups to present their analysis and findings to the class.

Further, the topic for class discussion will be mentioned beforehand and students should be ready to discuss these topics (in groups) in class. Students are required to meet in groups before coming to class and prepare on the topic. Few topics are mentioned below as examples. Instructor can add or change any topic as per requirement.

Topic 1- Is innovation manageable or just a random gambling activity?

Topic 2- Innovation: Co-operating across networks vs. 'go-it-alone' approach

Topic 3- Major Court battles regarding violation of patents between corporate companies

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Program: B. Tech. Computer Science and Business Systems					**Semester:** IV
Course/Module: Business Communication & Value Science -III					**Module 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 in Question Paper)**
3	2	1	5	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: -Basic Knowledge of English (verbal and written)
-Completion of all units from Semesters 1, 2 and 3

Objectives: Develop technical writing skills, introduce students to Self-analysis techniques like SWOT & TOWS, Introduce students to key concepts of: Pluralism & cultural spaces, Cross-cultural communication, Science of Nation building

Outcomes: On completion of the course students will be able to:

1. Understand, analyze & apply the basic principles of SWOT & life positions, power of motivation in real life
2. Identify & respect diversity in Indian Culture and pluralism in cultural spaces
3. Understand and apply the concepts of Global, glocal and trans-locational, cross cultural communication.
4. Identify the common mistakes made in cross-cultural communication to eliminate them and effectively engage in cross cultural communication.
5. Apply the science of Nation building
6. Understand, apply & analyze the tools of technical writing and apply the best practices of technical writing
7. Recognize the roles and relations of different genders.
8. Understand Artificial intelligence & recognize its impact in daily life

Detailed Syllabus:

Unit	**Description**	**Duration**
1	Basic principles of SWOT and Life Positions**;** SWOT Vs. TOWS- The Balancing Act; Application of SWOT in real life scenarios; Motivation	10

	and its importance; Maslow's hierarchy of needs	
2	Diversity-deep and surface level diversity; Recognizing Diversity; Types of diversity-gender Diversity, cultural diversity etc.; Implications of Diversity including gender diversity; between global, glocal and translocational culture; Cross cultural Communication and its dynamics; Common Mistakes in Cross cultural Communication and effective cross cultural Communication	15
3	Technical Writing- importance and best practices; Applications of best practices in Technical Writing; The science of nation Building	15
4	Artificial Intelligence- Meaning, definition, importance and applications	5
	Total	**45**

Text Books:

1.Bovee, C., Thill, J., & Roshan Lal Raina (2013). Business Communication Today (14th ed.). Pearson.
2.Fred Luthans (2013), 'Organizational Behavior', McGraw Hill, 12th Edition

Reference Books:

1.Meenakshi Raman and Sangeeta Sharma (2015), Technical Communication Oxford University Press,3rd Edition

Web Refernces:

https://freelance-writing.lovetoknow.com/kinds-technical-writing

https://clickhelp.com/clickhelp-technical-writing-blog/11-skills-of-a-good-technical-writer/

https://www.hult.edu/blog/benefits-challenges-cultural-diversity-workplace/

https://you2https://m.youtube.com/watch?feature=youtu.be&v=IIKvV8_T95M

https://m.youtube.com/watch?feature=youtu.be&v=e80BbX05D7Y

https://m.youtube.com/watch?v=dT_D68RJ5T8&feature=youtu.be

https://m.youtube.com/watch?v=7sLLEdBgYYY&feature=youtu.be

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Any other information:

Total Marks of Internal Continuous Assessment (ICA): 50 Marks

Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

Pedagogy: A learner oriented Pedagogy is the most defining attribute of this course and the course components are to be executed with a focus on understanding and most importantly application of these components. This objective is to be achieved through individual activities, group activities; debate and group discussions to improve on articulation and communication amplification; and project based learning.

Details of Term work:
Quiz and at the end of each Unit
Written submissions based on tenets of technical writing
Project: Visit rural area/ underprivileged parts of city to address some of the local issues; if relevant, suggest a practical technology solution to the issues.

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Program: B. Tech. Computer Science and Business Systems				**Semester:** IV	
Course/Module: Operations Research				**Module 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 in Question Paper)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Nil

Objectives:

Introduction to subject as a logical, Quantitative approach in decision-making. To introduce and exercise a range of analytical modeling techniques useful in decision-making in the system design environment.

Outcomes: After successful completion of this course, students will be able to

1. Implement concepts of Linear Programming.
2. Solve assignment and transportation problems.
3. Implement Network analysis and Queuing theory.
4. Demonstrate use of Inventory control and Simulation Methodology

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to OR:** Origin of OR and its definition. Concept of optimizing performance measure, Types of OR problems, Deterministic vs. Stochastic optimization, Phases of OR problem approach – problem formulation, building mathematical model, deriving solutions, validating model, controlling and implementing solution.	01
2	**Linear Programming:** Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Implicit assumptions of LPP. Some basic concepts and results of linear algebra – Vectors, Matrices, Linear Independence / Dependence of vectors, Rank, Basis, System of linear eqns., Hyperplane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions. Geometric method: 2-variable case, Special cases – infeasibility,	08

	unboundedness, redundancy & degeneracy, Sensitivity analysis. Simplex Algorithm – slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms.	
3	**Transportation and Assignment problems:** TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution. AP - Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method – Hungarian, test for optimality (MODI method), degeneracy & its resolution.	06
4	**PERT – CPM:** Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off.	05
5	**Inventory Control:** Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models – EOQ, POQ & Quantity discount models. EOQ models for discrete units, sensitivity analysis and Robustness, Special cases of EOQ models for safety stock with known / unknown stock out situations, models under prescribed policy, Probabilistic situations.	03
6	**Queuing Theory:** Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase). Kendall's notation, Little's law, steady state behaviour, Poisson's Process & queue, Models with examples - M/M/1 and its performance measures; M/M/m and its performance measures; brief description about some special models.	04
7	**Simulation Methodology**: Definition and steps of simulation, random	03

	number, random number generator, Discrete Event System Simulation – clock, event list, Application in Scheduling, Queuing systems and Inventory systems.	
	Total Hours	**30**

Text Books:

1. H.A. Taha, "Operations Research: An Introduction", Pearson Education, 10th edition 2019.

Reference Books:

1. K.G. Murthy, "Linear Programming", John Wiley & Sons, 1983.
2. G. Hadley, "Linear Programming", Narosa, 2002.
3. H.M. Wagner, "Principles of OR with Application to Managerial Decisions" Prentice Hall India Learning Pvt., 1980.
4. F.S. Hiller and G.J. Lieberman, "Introduction to Operations Research", McGraw Hill Education, 2017.
5. Thomas L. Saaty, "Elements of Queuing Theory", McGraw-Hill Inc., Us, 1961.
6. Edited By A. Ravi Ravindran, "Operations Research and Management Science, Hand Book", CRC Press, 2011.
7. Wiest & Levy, "Management Guide to PERT/CPM", Prentice Hall, 1970
8. J.W. Prichard and R.H. Eagle, "Modern Inventory Management", Wiley, New York, 1965.

Any other information:
Total Marks of Internal Continuous Assessment (ICA): 50 Marks
Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

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Signature **Signature**
(Prepared by Concerned Faculty/HOD) **(Approved by Dean)**

Program: B. Tech. Computer Science and Business Systems	**Semester:** IV
Course/Module: Essence of Indian Traditional Knowledge	**Module 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 in Question Paper)**
2	0	0	0	Marks Scaled to 50	-

Pre-requisite:

Objectives: This course provides introduction to Indian traditional knowledge and its relevance in the modern society.

Outcomes: After completion of the course, students would be able to:

1. Understand the concept of Traditional knowledge and its importance
2. Apply the concept of Vedic mathematics to solve problems
3. Understand relevance of Chanakya niti in modern management.

Detailed Syllabus:

Unit	**Description**	**Duration**
1	**Introduction to traditional knowledge:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge	5
2	**Traditional knowledge in different sectors:** Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of	5

	biodiversity, Food security of the country and protection of TK.	
3	**Vedic mathematics:** Introduction, subtraction, multiplication, division, linear and quadratic equations, simultaneous linear equations, factorizations	10
4	**Chanakya and modern management:** leadership, qualities of a leader, people management, strategy, teamwork	10
	Total	**30**

Text Books:

1. R. Pillai, "Corporate Chanakya", Jaico Publishing House: Mumbai, 2012.
2. S. B. K. Tirtha and V. S. Agrawala, "Vedic Mathematics", New Delhi: Motilal Banarsidass, 2004.
3. A. Jha, "Traditional Knowledge System in India", New Delhi: Atlantic Publishers and Distributors (P) Ltd, 2009.

Reference Books:

1. D. Bathia, "Vedic Mathematics Made Easy", Mumbai: Jaico Publishing House, 2014.
2. B. K. Mohanta and V. K. Singh, "Traditional Knowledge System and Technology in India", Delhi: Pratibha Prakashan, 2012.
3. S. Bose, "Vedic Mathematics", V&S Publishers: New Delhi, 2015.

Any other information:
Total Marks of Internal Continuous Assessment (ICA): 50 Marks
Distribution of ICA Marks:

Description of ICA	**Marks**
Class Test 1	10
Class Test 2	10
Term Work	30
Total Marks :	**50**

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)