Samrat Ashok Technological Institute (Engineering College) Vidisha, Madhya Pradesh
(An Autonomous Institute Affiliated to RGPV, Bhopal)
Syllabus for III and IV Semester B. Tech.

(Effective from 2018-2019 Admitted Batches)

Subject Code	Subject Name/ Title	L	T	P	Allotment of Marks			Total Marks	End Sem. Exam Time	Credits
					Mid Sem.	Assignment/ Quiz	End Sem.			
CS-1841	**Managerial Economics**	**3**	**0**	**1**	**20**	**10**	**70**	**100**	**3hrs.**	**4**

Introduction:
The purpose of this course is to provide students with a basic understanding of the Economic theories and analytical tools that can be used in decision making process. Identifying problems and formulating them into a managerial model, price determination in alternative market structure, demand theory and production and cost function.

Course Objectives:

1. To understand the basic principles of economics for an efficient decision making.
2. To gain knowledge of management principles in order to manage businesses and institutions efficiently.
3. To acquire the basics of entrepreneurship to establish industrial and economic activities.

Course Outcomes:

1. To understand the fundamentals of Economics in view of its nature, demand, Profit and Firm. Consumption, markets and business ownership aspects and how they are helpful in decision making process in order to sustain the economic activities.
2. To be aware of the significant role of an entrepreneur in the establishment, Development and achievement of organizational goals and objectives and also to learn importance of team work in demand forecasting and other functions of the organization.
3. To understand the fundamentals of management and business practices with respect to pricing and competition, cost analysis, business cycle and organization.

COURSE CONTENT

Unit-I

Introduction: Wealth, Welfare and Scarce Definitions of Economics; Micro and Macro Economics. Meaning of Managerial Economics and its scope in engineering perspective, Relationship with other areas in Economics, Basic economic principles – Opportunity cost, Incremental concept, Marginalize, Equi-marginal, Time perspective, Discounting principle, Objectives of Firms, Theories of profit, Measurement of profit.

Unit-II

Analysis of Demand: Meaning of Demand, Demand Analysis, Law of Demand, Determinates of Demand, Demand function, Indifference curve, Elasticity of Demand, Types of Elasticity, and Uses of concept of Elasticity of demand in managerial decision. Law of supply, Elasticity of supply, Consumer Behaviour theory. Utility Law of Diminishing Marginal Utility and its limitations.

P.T.O

Unit-III

Demand Forecasting and Entrepreneurship: Meaning, Significance, Methods of Forecasting, Forecasting of a new product, Production function, Production function with one/two variables, Laws of returns to scale, Law of Diminishing returns scale. Entrepreneurship: Entrepreneurial Functions, Entrepreneurial Development: Objectives, Training, Benefits; Phases of Installing a Project.

Unit-IV

Cost Analysis: Theory of cost, Accounting Cost Concepts, Analytical Cost Concepts, Short Run and Long Run Cost-output Relations, Break even analysis, Cost reduction and control. Meaning of Inflation, Types, Causes & Prevention methods, Business Cycles, Phases of business cycle.

Unit-V

Market Structure and Pricing Theory: Features and Types of different competitive situations, Price-Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both the long run and short run sorbent features of price determination and Price discrimination. **Forms of Business Organizations**: Sole Proprietorship, Partnership, Joint Stock Company- Private limited and public limited companies, Public enterprises and their types.

Reference Books

1. **Managerial Economics**, Cauvery, U.K. Sudha Nayak
2. **Managerial Economics for Engineering**, Prof. D.N. Kakkar
3. **Managerial Economics** D.N. Dwivedi . Vikas Publishing House Pvt. Ltd.
4. **Principles of Economics** Robert H. Frank, Ben .S. Bernanke Tata McGraw Hill.
5. Mehta, P.L., **Managerial Economics Analysis, Problems**, Cases, Sultan Chand and Sons, New Delhi, 2001.
6. James L. Pappas and Engene F. Brigham, **Managerial Economics**, Pearson Education, New Delhi, 2006.
7. K.K. DEWETT, **Modern Economic Theory**, S. Chand and Company, New Delhi.-55.
8. S. C. Sharma and Banga T. R., **Industrial Organization & Engineering Economics,** Khanna Publications, Delhi -6.

4/6/19 04.06.19 4/6/19 04/06/2019

Semester-IV

Category of Course	Course Title	Course Code	Credits=4			Max. Marks-70 Min. Marks-22 Duration-3Hrs.
			L	T	P	
DC	Analysis and Design of Algorithm	CSE-1842	3	--	2	

Pre-requisites

- Math foundations: elementary set theory, concepts of relations and functions, mathematical induction
- Data structures & Algorithms.
- Programming languages: a general-purpose programming language.

Course Objectives:

- Determine different time complexities of a given algorithm
- Demonstrate algorithms using various design techniques.
- Develop algorithms using various design techniques for a given problem.

Contents:

UNIT I: Algorithms, Characteristics of algorithm. Analysis of algorithm: Asymptotic Notations Time Complexity Analysis of Algorithm such as Linear Search, Insertion Sort, Heap sort etc. Recursive Algorithms Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit II: Divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

UNIT III: Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms- Dijkstra's Algorithms and Complexity Analysis, Transitive closure, Minimum Spanning Tree- Prim's and Kruskal's Algorithm and their complexity analysis, Union Find Data Structure, Topological sorting, Network Flow Algorithm.

UNIT IV: Greedy Algorithms: Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, Huffmancoding, singlesourceshortestpathalgorithm. Dynamic Programming: Multistage Graph, all pairs shortest paths, 0-1 Knapsack, Traveling salesperson problem, Chained matrix multiplication, Longest common subsequence.

UNIT V: Back tracking concept and its examples like 8 queens's problem, Hamiltonian cycle, Graph coloring problem etc. Branch & bound method-Solution of travelling salesman problem using branch and bound .Lower bound theory and its use in solving algebraic problem. Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard.Standard NP-complete problems and Reduction techniques.

Course Outcomes

CO-1: Analyse worst-case running times of algorithms based on asymptotic analysis and **justify** the correctness of algorithms.

CO-2: Describe the divide-and-conquer paradigm and **explain** when an algorithmic design situation calls for it. **Synthesize** divide-and-conquer algorithms. **Derive** and **solve** recurrence relation.
CO-3: Model graph or Tree for a given engineering problem and **write** the corresponding algorithm to **solve** the problems.
CO-4: Describe the Greedy and Dynamic-programming paradigm and **explain** when an algorithmic **design** situation calls for it.
CO-5: Describe the concept of Backtracking, Branch and Bound and Lower Bound Theory in solution of hard problems.

Reference Books:

1. Thomas Cormen, Charles Leiserson, Ronald Rivest and Cliford Stein, "Introduction to Algorithms", PHI, 3rd edition, ISBN-13: 978-8120340077
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Universities Press, 2nd edition (2008), ISBN-13: 978-8173716126
3.Gilles Brassard and Paul Bratley, "Fundamentals of Algorithmics", PHI, ISBN-13: 978-8120311312

04/06/19 09.6.19

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Category of Course	Course Title	Course Code	Credits=4			Max. Marks-70 Min. Marks-22 Duration-3Hrs.
			L	T	P	
DC	Database Management System	CSE-1843	3	--	2	

Semester -IV
Prerequisite: Basic Knowledge of Mathematics and Programming.

Course Objectives:

At the completion of this course, students should be able to do the following:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models and database normalization.
3. To understand and use data manipulation language to query, update, and manage a database
4. To develop an understanding of essential DBMS concepts such as: concurrency, recovery, backup.
5. Identifies the file organization methods access methods to store the data.

Course Contents:

UNIT I: Database System- concepts and architecture: Data modeling using the Entity Relationship (ER) modeling and Enhanced Entity Relationship (EER) modeling, Specialization and Generalization.

UNIT II: The Relational Model: Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

UNIT III: Database design theory and methodology: Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design.

UNIT IV: Transaction processing concepts: Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques

UNIT V: Data Storage and indexing: Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing, Introduction to database security.

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Course Outcomes: The students would be able to

CO-1: Able to understand the basic concepts, principles and applications of database system.

CO-2: Able to discuss the components of DBMS, data models, Relational models.

CO-3: Able to use knowledge to find the functional dependencies and differentiate between different normal forms.

CO-4: Able to execute transaction concepts and concurrency protocols

CO-5: Able to Design the databases system.

Reference Books:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (7/e), Pearson Education, 2016
2. Silberschatz, Korth, "Data base System Concepts", 7th ed., McGraw hill, 2019.
3. C. J. Date, "An Introduction to Database Systems", 8th ed., Pearson, 2003.
4. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2014.
5. Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management (7/e), Cengage Learning, 2007.

Semster-IV

Category of Course	Course Title	Course Code	Credits=4			Max. Marks-70
			L	T	P	Min. Marks-22
DC	Formal Language and Automata Theory	CSE-1844	3	--	2	Duration-3Hrs.

Pre-Requisite: Discrete Structures
Course Objectives: Upon completing the course, the student will:

1. Understand the concepts of Theory of computation in computer science.
2. Understand the relationship among formal languages, formal grammars, and automata.

UNIT-I Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.
Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets and expression, FSM to regular expression(RE), RE to FSM, Myhill-Nerode theorem Pumping lemma for regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT – II Context –Free Grammars: Concept of language - grammars and production rules - Chomsky hierarchy, Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT – III Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, nondeterministic pushdown automata (PDA) ,acceptance by two methods and their equivalence., PDA corresponding to given CFG, CFG corresponding to a given PDA.
Context Free Languages: The pumping lemma for CFL, Closure and decision properties of CFLs. Context-sensitive languages: Context-sensitive grammars (CSG) and languages.

UNIT – IV Turing Machines: The basic model for Turing machines (TM), Turing-recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators. Universal Turing machine.

UNIT – V Tractable and Intractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, travelling sales man problem, Partition problem et, undecidable problems about languages..

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Course Outcomes: The students would be able to

CO-1: Analyze and prove the equivalence of languages and design finite state machines and convert regular expressions to FSA.

CO-2: Design context free grammars, Construct pushdown automata and Determine equivalence of languages accepted by Push down Automata.

CO-3: Demonstrate the construction of a Turing Machine.

CO-4: Distinguish between computability and non-computability and Decidability and undecidability.

Reference Books:

1. John E. Hopcroft, Jeffery Ullman," Introduction to Automata theory, Languages & computation" , Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran," Theory of Computer Science", PHI Learning.
3. Michael Sipser," Theory of Computation ",Cenage Learning.
4. John C Martin, " Introduction to languages and theory of computation", McGraw Hill.
5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
6. Kohavi,"Switching & Finite Automata Theory", TMH.

Semester IV

Categories of Course	Course Title	Course Code	Credits = 4			Max Marks: 70 Min Marks: 22 Duration: 3:00 Hrs.
			L	T	P	
DC	Operating System	CSE-1845	3	0	0	

Prerequisites: Basic knowledge of computers, its components and programming skills

Course Objectives:
To understand operating system architecture and functioning along with in-depth knowledge of internals and working of OS modules like process management, Storage management, file system, security and protection

UNIT I :Overview-Introduction to Operating Systems, Evolution of Operating System mainframe, desktop, multiprocessor, Distributed, Network Operating System, and Clustered and Handheld System), Operating System Structure- Operating System Services and System Calls, System Programs. Types of Operating Systems: Batch Processing, Real Time, Multitasking and Multiprogramming, time-sharing system and Distributed Operating systems

UNIT II: Process Management-Concept, Process Control Blocks (PCB), Process Scheduling. Scheduling Criteria, Scheduling Algorithms and their evaluation. Threads Overview and Multithreading Models Inter Processes Communication and Critical Section Problem and Solution-Semaphores and Monitors, Deadlock Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection and recovery from deadlock

UNIT III: Storage Management-Memory Hierarchy, Concepts of memory management, MFT and MVT, logical and physical address space, swapping, contiguous and non- contiguous allocation, Paging and Segmentation Structure and Implementation of Page table, Virtual memory, Cache Memory Organization, Demand paging, Page replacement Algorithms. Thrashing, Demand segmentation

UNIT IV: File and Disk Management-File concepts, Access methods, Directory Structure, File Sharing and Protection, Free space management, Efficiency and Performance- Case study on Unix, Linux and Windows, Disk Structure and Scheduling, efficiency case study of UNIX.I?O system –Hardware ,Application, input-output interface.

UNIT V: Protection and Security- Protection Goals of Protection, Principles of Protection, Domain of Protections. Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights Security The Security Problem, Program threats system and network threats, Cryptography as s security tool, user authentication, implementation of security defense- Firewall system, Case study - LINUX and Windows

Course Outcomes

CO -1: Understanding of the inherent mechanism involved in functioning of an operating system.
CO -2: Ability to analyse various scheduling and synchronisation techniques.
CO -3: Knowledge of file systems its implementation and protection.
CO -4: Analysis of memory and device management methodology.
CO -5: Comprehensive outlook in design principles of operating systems.

References

1. Peterson, J.L. &Silberschatz, A.: Operating System Concepts, Addison, Wesley-Reading.
2. Brinch, Hansen: Operating System Principles, Prentice Hall of India.
3. Haberman, A.N.: Introduction to Operating System Design Galgotia Publication, New Delhi.
4. Tanenbaum, A.S.: Operating Systems.
5. Hansen, P.B.: Architecture of Concurrent Programs, PHI.
6. Shaw, A.C.: Logic Design of Operating Systems, PHI.

Category of Course	Course Title	Course Code	Credits=1			
			L	T	P	
DLC	Python	CSE-1846	--	--	2	

Prerequisites:

- High School Level Mathematics
- Elementary Knowledge of Computer

Course Objective:

This course introduces core programming basics—including data types, control structures, algorithm development, and program design with functions via the Python programming language. The course discusses the fundamental principles of Object-Oriented Programming.

Course Content:

UNIT I: Introduction to computer science, algorithms, data representation in computers, hardware, software and operating system. Installation of python- interactive shell, IDLE, saving, editing, and running a script. The concepts of datatypes: variables, immutable variables, numerical types, operators, expressions, Indentation and comments in the program.

Unit II: Conditional Statements- Conditions, Boolean Logic, Logical operators and Ranges. Control Statements- Break, Continue and Pass. Flow Control-if, if-else, nested if-else, Loop statements- for loop, while loop, Nested loops.

Unit III: String: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Strings and text files, manipulating files and directories, **os** and **sys** modules, text files: reading/writing text and numbers from/to a file, creating and reading a formatted file (csv or tab-separated).

Unit IV: Lists, tuples, and dictionaries. basic list operators, replacing, inserting, removing an element, searching and sorting lists, dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries.

Unit V: Classes and OOP: Classes, objects, attributes and methods, defining classes, design with classes, Inheritance, Overloading, Overriding, Data hiding. **Exception:** Exception Handling, Except clause, Try finally clause, User Defined Exceptions.

Course outcome:

CO-1: Ability to install python and its different packages.

CO-2: Implement solution logic of problem and draw it in the form of algorithm.

CO-3: Design and write a python program for given algorithm.

CO-4: UNderstand Object Oriented with reference to python programming.

References Books:

Python Programming , R. Nageshwar Rao, Wiley India

Think Python: Allen B. Downey, O'R