UEM, KOLKATA				
SYLLABUS FOR B.TECH (CSE / CSE (AIML) / CSE(IOT, CYS, BCT)) BATCH 2021 - 2025				
Semester : 4				
Sr. No	**Type of Course**	**Course Code**	**Course Title**	**Credits**
1	Professional Core Courses	PCC-CSE401	Discrete Mathematics	**4**
2	Professional Core Courses	PCC-CSE402	Computer Organization & Architecture	**3**
3	Professional Core Courses	PCC-CSE492	Computer Organization & Architecture Laboratory	**2**
4	Professional Core Courses	PCC-CSE403	Operating Systems	**3**
5	Professional Core Courses	PCC-CSE493	Operating Systems Laboratory	**2**
6	Professional Core Courses	PCC-CSE404	Design & Analysis of Algorithms	**3**
7	Professional Core Courses	PCC-CSE494	Design & Analysis of Algorithms Laboratory	**2**
8	Professional Core Course	PCC-CSE405	Artificial Intelligence & Machine Learning	**3**
9	Professional Core Course	PCC-CSE495	Artificial Intelligence & Machine Learning Laboratory	**2**
10	Humanities and social sciences including Management Courses	HSMC-CSE401	Management I : Organizational Behavior	**3**
11	Mandatory Courses	MC-CSE401	Environmental Sciences	**0**
12	Humanities and social sciences including Management Courses	HSMC-CSE402	ESP - IV	**0.5**
13	Humanities and social sciences including Management Courses	HSMC-CSE482	SDP - IV	**0.5**
14	Mandatory Additional Requirements (MAR)	MC-CSE481	Mandatory Additional Requirements (MAR)	**0**
15	Project	PROJ-CSE401	Innovative Project - II	**1**
16	MOOCs (Mandatory for Honours)	MOOC 4	Massive Open Online Courses (Mandatory for B.Tech(Honours))	**1**
Total Credit Points of Semester [for B.Tech]				**29**
Total Credit Points of Semester [for B.Tech (Hons.)]				**30**

Course Title: Discrete Mathematics

Course Code: PCCCSE401

Credit: 4

Module 1: Propositional Logic:

Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Biconditional statements with truth table, Logical Equivalence, Tautology, Normal forms - CNF, DNF; Predicates and Logical Quantifications of propositions and related examples.

Module 2: Theory of Numbers:
Well Ordering Principle, Divisibility theory and properties of divisibility; Fundamental theorem of Arithmetic;

Euclidean Algorithm for finding G.C.D and some basic properties of G.C.D with simple examples; Congruences, Residue classes of integer modulo () n n Z and its examples;

Module 3: Order, Relation and Lattices:
POSET, Hasse Diagram, Minimal, Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices.

Module 4: Counting Techniques:
Permutations, Combinations, Binomial coefficients, Pigeon- hole Principle, Principles of inclusion and exclusions; Generating functions, Recurrence Relations and their solutions using generating function, Recurrence relation of Fibonacci numbers and its solution, Divide-and-Conquer algorithm and its recurrence relation and its simple application in computer.

Module 5: Graph Coloring:
Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring.

Module 6: Matchings:
Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems.

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw Hill.
2. Russell Merris, Combinatorics, WILEY-INTERSCIENCE SERIES IN DISCRETEMATHEMATICS AND OPTIMIZATION
3. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
4. Gary Haggard, John Schlipf and Sue Whitesides, Discrete Mathematics for Computer Science, CENGAGE Learning.
5. Gary Chartrand and Ping Zhang – Introduction to Graph Theory, TMH

Course Title: Computer Organization & Architecture

Course Code: PCCCSE402

Credit: 3

Topic:-

Module 1:

a) Introduction to computer organisation & architecture

b) Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler.

c) Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes

d) Quantitative techniques in computer design - Part1

e) Introduction to Von-Nuemann& Harvard Architecture

Module 2:

a) Commonly used number systems. Fixed and floating-point representation of numbers; Concept of Overflow and Underflow.

b) Design of adders - ripple carry and carry look ahead principles.

c) Fixed point multiplication - Unsigned and Signed - Booth's algorithm.

d) Fixed point division - Restoring and non-restoring algorithms.

e) Floating point - IEEE 754 standard.

f) Design of ALU.

g) Design of control unit - hardwired and microprogrammed control.

Module 3:

a) Memory organization, static and dynamic memory, memory hierarchy, associative memory.

b) Hierarchical memory technology: Inclusion, Coherence and locality properties

c) Cache memory organizations, Techniques for reducing cache misses;

d) Virtual memory organization, mapping and management techniques, memory replacement policies.

e) Memory unit design with special emphasis on implementation of CPU-memory interfacing. Data path design for read/write access.

f) I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA

Module 4:

a) Quantitative techniques in computer design - Part2

b) Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards and structural hazards, techniques for handling hazards.

c) Pipeline optimization techniques, Compiler techniques for improving performance.

d) Instruction-level parallelism: basic concepts, techniques for increasing ILP, superscalar, super pipelined architectures. Array and vector processors.

Module 5:

a) Multiprocessor architecture: taxonomy of parallel architectures - Introduction to Flynn's Classification; Centralized shared - memory architecture: synchronization, memory consistency, interconnection networks. Distributed shared memory architecture.

b) Non von-Neumann architectures - Data flow computers.

c) Introduction to RISC architectures. RISC vs CISC architectures

Text Books:

1. Computer Organization and Architecture: Designing for Performance, William Stallings, Prentice-Hall India
2. Computer Organization, Carl Hamacher, ZvonkoVranesic and SafwatZaky, Tata McGraw Hill
3. Computer Architecture A Quantitative Approach, John L Hennessy and David Patterson, Morgan Kaufman
4. Structured Computer Organization, Andrew S. Tanenbaum, Prentice-Hall India
5. Computer Architecture & Parallel Processing. Kai Hwang & Briggs, Tata McGraw Hill
6. Computer System Architecture, M. M. Mano, PHI.
7. Computer Organization & Architecture, P N Basu, Vikas Publication

Course Title: Computer Organization & Architecture Laboratory

Course Code: PCCCSE492

Credit: 2

Computer Organization:

1. Design register circuits.
2. Design of an adder-subtractor composite circuit.
3. Design a Carry save adder circuit.
4. Design a Carry skip adder circuit.
5. Design a Carry look-ahead adder circuit.
6. Design the circuit for a BCD adder circuit.
7. Design a n-bit simple ALU design using multiplexer.
8. Verification of RAM IC – its read write operations and designing memory storage circuit using RAM IC.

Computer Architecture:

1. HDL introduction.
2. Basic digital logic based programming using VHDL.
3. Combinational – Sequential circuit programming simulation.
4. Addition, multiplication, division operations implementation.
5. Register design.
6. Simple ALU design.
7. Simple CPU design.
8. Interfacing of CPU with memory unit.

Text Books:

1. Computer Organization and Architecture: Designing for Performance, William Stallings, Prentice-Hall India.
2. Computer Organization, Carl Hamacher, ZvonkoVranesic and SafwatZaky, Tata McGraw Hill
3. Computer Architecture A Quantitative Approach, John L Hennessy and David Patterson, Morgan Kaufman
4. Structured Computer Organization, Andrew S. Tanenbaum, Prentice-Hall India
5. Computer Architecture & Parallel Processing. Kai Hwang & Briggs, Tata McGraw Hill
6. Computer System Architecture, M. M. Mano, PHI.

Course Title: Operating Systems
Course Code: PCCCSE403
Credit: 3

Topic:-

Module 1: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch,multi-programmed, time-sharing, real-time, distributed, parallel.

Module 2: Computer system operation, I/O structure, storage structure, storage hierarchy, different types ofprotections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Module 3: Processes: Concept of processes, process scheduling, operations on processes, co-operatingprocesses, inter-process communication.

Module 4: Threads: Overview, benefits of threads, user and kernel threads.

Module 5: CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Module 6: Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Module 7: Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Module 8: Memory Management: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Module 9: Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

Module 10: File Systems: file concept, access methods, 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 & performance.

Module 11: I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and non-blocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Module 12: Disk Management [4L]: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.

Module 13: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Text Books:

1. Milenkovie M., “Operating System: Concept & Design”, McGraw Hill.
2. Tanenbaum A.S., “Operating System Design & Implementation”, Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., “Operating System Concepts”, Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, “Operating Systems”, Maxwell McMillan International Editions, 1992.
6. Dietel H. N., “An Introduction to Operating Systems”, Addison Wesley

Course Title: Operating Systems Laboratory
Course Code: PCCCSE493
Credit: 2

Topic:-
Module 1: Shell programming: creating a script, making a script executable, shell syntax (variables,conditions, control structures, functions, commands).

Module 2: Process: starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.

Module 3: Signal: signal handling, sending signals, signal interface, signal sets.

Module 4: Semaphore: programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).

Module 5: POSIX Threads: programming with pthreadfunctions(viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)

Module 6: Inter-process communication: pipes(use functions pipe, popen, pclose), namedpipes(FIFOs, accessing FIFO)

Text Books:

1. Milenkovie M., "Operating System: Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley

Course Title: Design & Analysis of Algorithms
Course Code: PCCCSE404
Credit: 3

Topic:-
Module 1: Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Master's theorem; Divide and Conquer algorithms – Merge Sort, Quick Sort, Finding lower bound of comparison-based sorting algorithms, Strassen's algorithm for multiplying matrices.

Module 2: Fundamental Algorithmic Strategies: Brute-force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem solving, Bin Packing, Knapsack, TSP, Heuristics – characteristics and their application domains, KMP algorithm.

Module 3: Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS), Disjoint Set Data Structures, Shortest paths algorithms, Minimum Spanning Tree, Topological sorting, Network Flow Problem.

Module 4: Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard, Cook's theorem, Standard NP-complete problems and Reduction techniques.

Module 5: Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE.

Text Books:

1. Introduction to Algorithms, 4th Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Algorithms, 4th Edition, Robert Sedgewick and Kevin Wayne, Princeton University.
3. Fundamental pf Algorithms – E. Horowitz et al.
4. Algorithm Design, 1st Edition, Jon Kleinberg and EvaTardos, Pearson.
5. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
6. Algorithms – A Creative Approach, 3rd Edition, UdiManber, Addison-Wesley, Reading, MA.
7. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing Housh (AICTE Recommended Textbook – 2018)
8. Algorithms Design and Analysis, Udit Agarwal, DhanpatRai.

Course Title: Design & Analysis of Algorithms Laboratory
Course Code: PCCCES494
Credit: 2

Topic:-

Module 1: Divide and Conquer Algorithm:
Implement Binary Search using Divide and Conquer approach, Implement Merge Sort using Divide and Conquer approach, Implement Quick Sort using Divide and Conquer approach, Find the Maximum and the Minimum element from a given array of integers using Divide and Conquer approach, Find the Median of two sorted arrays using Divide and Conquer approach, Find the Bitonic point in Bitonic sequence using Divide and Conquer approach, Implement the Multiplication of two matrices using Strassen's Divide and Conquer approach, Find the neighbors of the Median element using the partitioning strategy of Quick Sorting method.

Module 2: Linear-time Sorting Algorithm:
Implement Count Sort, Implement Dictionary Sorting Strategy.

Module 3: Dynamic Programming:

Implement the Coin-exchange problem using Dynamic Programming, Find the Minimum number of scalar multiplications needed for a given chain of matrices using Dynamic Programming, Implement the Single Source Shortest Paths problem for a given directed graph (Bellman-Ford algorithm), Implement the All-Pair Shortest Paths problem for a given directed graph (Floyd-Warshall algorithm), Implement the Traveling Salesman Problem using Held-Karp algorithm, Find the minimum edit distances to convert one string into another string using Dynamic Programming, Implement the 0-1 Knapsack problem using Dynamic Programming, Implement the Subset-Sum problem using Dynamic Programming.

Module 4: Branch and Bound:
Implement the 15-Puzzle Problem using Branch and Bound algorithm.

Module 5: Backtracking:
Implement the 8-Queen Problem using Backtracking, Implement the Graph Coloring Problem using Backtracking, Implement the Hamiltonian Problem using Backtracking.

Module 6: Greedy Algorithm:

Implement the Fractional Knapsack Problem using greedy method, Implement the Job sequencing with deadlines using greedy method, Implement the Single Source Shortest Paths problem for a given directed graph (Dijkstra's algorithm), Implement the Minimum Cost Spanning Tree using Prim's algorithm, Implement the Minimum Cost Spanning Tree using Kruskal's algorithm.

Module 7: Fundamental Graph Algorithm:
Implement Breadth First Search (BFS), Implement Depth First Search (DFS), Find all Strongly Connected components of a given directed graph using Kisarazu's algorithm, Implement the Union-Find algorithm, Find the Max-Flow of a given Flow network using Ford-Fulkerson method.

Module 8: String Matching Problem:
Implement the String-Matching Problem using Knuth-Morris-Pratt algorithm.

Text Books:

1. Introduction to Algorithms, 4th Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Algorithms In A Nutshell, George T. Heineman, Gary Pollice and Stanley Selkow, O'Reilly.
3. Fundamental pf Algorithms – E. Horowitz et al.
4. Algorithm Design, 1st Edition, Jon Kleinberg and EvaTardos, Pearson.
5. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
6. Algorithms – A Creative Approach, 3rd Edition, UdiManber, Addison-Wesley, Reading, MA.
7. Design & Analysis of Algorithms, Gajendra Sharma, Khanna Publishing Housh (AICTE Recommended Textbook – 2018).

Course Title: Artificial Intelligence & Machine Learning

Course Code: PCCCSE405

Credit: 3

Topic:-

Module 1: Introduction to Artificial Intelligence: The Foundations of Artificial Intelligence, The History ofArtificial Intelligence, and the State of the Art.
Knowledge Representation: A Knowledge-Based Agent, Knowledge Representation, Reasoning & Logic,Propositional Logic, Inference in First-Order Logic.

Module 2: Search techniques: AI-Problem formulation, solving problems by searching, uninformed search strategies:depth first search, breadth first search, depth limited search, iterative deepening search, bi-directional search.
Heuristic search strategies: Basics of heuristics, hill climbing strategy, simulated annealingstrategy, best-first search, A* search, constraint satisfaction problem solving strategy.
Adversarial search: AI-based interactive game playing scheme using the minimax strategy, alpha-beta pruning.

Module 3: Introduction to Machine Learning: Machine learning and it's types; Applications of machinelearning; Issues in machine learning, Concept of Data processing, Bias, variance.

Module 4: Linear Regression: Simple, Multiple, Polynomial, Least Square Gradient Descent Method, Derivations, Goodness of Fit.

Module 5: Logistic Regression: Sigmoid, Gradient of Logistic Regression, Binary Cross Entropy cost function, Decision boundary, Confusion matrix & related problems.

Module 6: Probability and Bayes learning: Bayes theorem, Bayesian learning, Concept of Support Vector Machine.

Module7: Data preprocessing: Feature Selection, Feature Reduction, PCA, Performance Evaluation of Classifiers, Cross Validation, Receiver Operating Characteristics Curve.

Module 8: Lazy Learners: K-nearest neighbors, Decision Tree, CART, Ensemble Methods, Bagging ,Boosting Random Forest.

Module 9: Artificial Neural Networks: Introduction, Backpropagation, Realization of Gates (AND, OR, XOR, NAND)

Module 10: Convolutional Neural Networks: Introduction, Regularization, CNN architectures, Concept of LeNet, VGG Net, Google Net, ResNet.

Module 11: Recurrent Neural Networks: Introduction, Deep RNNs, Bi-RNNs, Long Short-Term Memory

Module 12: Clustering: Partitioning Methods, K-means, K-medoids, Concept of Fuzzy Clustering, Hierarchical methods, Agglomerative Nesting (AGNES), Performance Evaluation.

Text Books:

1. ARTIFICIAL INTELLIGENCE Third Edition Paperback – 1 July 2017 **by** Kevin Knight, Elaine Rich , Shivashankar B. Nair.
2. Artificial Intelligence, Making a System Intelligent by Dr. Nilakshi Jain (Willey).
3. Artificial Intelligence and Soft Computing: Behavioral and Cognitive Modeling of the Human Brain by Amit Koner.
4. Machine Learning | First Edition | By Pearson Paperback by Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das.
5. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
6. Introduction to Machine Learning Edition 2, by Ethem Alpaydin
7. Deep Learning- Ian Goodfelllow, Yoshua Benjio, Aaron Courville, The MIT Press
8. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Course Title: Artificial Intelligence & Machine Learning Laboratory

Course Code: PCCCSE495

Credit: 2

Topic:-

Module 1:

a) Implementation of Decision Tree using scikit learn

b) Implementation of Random Forest using scikit learn
c) Implementation of Bagging method using scikit learn
d) Implementation of AdaBoost algorithm using scikit learn

Module 2:
a) Implementation of Ridge Regression using linear_model of scikit learn
b) Implementation of Elastic-Net using linear_model of scikit learn
c) Implementation of Lasso using linear_model of scikit learn
d) Implementation of Support Vector Regressor (with linear & non-linear kernel) using scikit learn

Module 3:
a) Implementation of unsupervised dimensionality reduction using principal component analysis in scikitlearn
b) Implement Locally linear embedding (LLE) using scikit learn
c) Implement Isometric Mapping algorithm using scikit learn
d) Implementation of Multi-dimensional Scaling (MDS) using scikit learn
e) Implementation of t-distributed Stochastic Neighbor Embedding (t-SNE) algorithm in scikit learn

Module 4:
a) Implementation of Label Propagation using scikit learn
b) Implementation of Label Spreading using scikit learn

Module 5:
a) Implementation of an Image classifier using 2D Convolutional Neural Network using Tensorflow / Keras
b) Implementation of Long Short Term Memory network using Tensorflow / Keras

Module 6:
a) Familiarization with Confusion matrix-based model evaluation metrics using Scikit learn
b) Familiarization with Regression model evaluation metrics using Scikit learn
c) Familiarization with Clustering model evaluation metrics using Scikit learn

Text Books:
1. The Hundred-page Machine Learning Book by Andriy Burkov, 2019, ISBN 978-1999579500
2. Hands on Machine Learning with Scikit Learn and Tensorflow by Aurélien Géron, 2017, ISBN 978-1491962299

Course Title: Organizational Behavior

Course Code: HSMC-CSE401

Credit: 3

Module 1
Introduction – a) defining organization, behavior and organizational behavior, b) assumptions of OB, c) principles of OB, d) levels of OB, e) scope of OB, f) OB and Human Resource Management, g) Applications of OB, h) Historical developments of OB, i) emerging concerns

Module 2
Perception and Learning – a) understanding perception, b)Basic elements of perception, c) Principles of perceptual selection, d) Perceptual grouping, e) Social Perception, f) Self-perception and identity, g) attribution of causality, h) Perceptual biases in social perception, i) Implications for human resource management, j) defining learning, k) classical and operant conditioning l) learning in organizations

Module 3
Personality – a) Defining Personality, b)History of the concept, c) Key assumptions, d) biological and social determinants, e)Theories – Intrapsychic theory, social learning theory, self-theory, Trait and type theories f) Related concepts (locus of control, dogmatism, authoritarianism, Machiavellianism),

g) measuring personality.

Module 4

Attitudes – a) Definition, b)Key elements of attitudes, c)Attitudes and related concepts (Values, opinion, belief and ideology), e) Characteristics of attitudes, f) Attitude formation, g) Attitude measurement, h) Changing attitudes, i) Attitudes at workplace (job satisfaction, work attitude and organizational commitment), j) Prejudice and discrimination at workspace.

Module 5

Emotions in workplace - a) Definition, b) Types of emotions, c) Related concepts (mood, temperament), d) Stress in workplace, e) General Adaptation Syndrome, f) Managing Stress, g) Psychosomatic disorders and stress h) emotional labor and emotional contagion.

Module 6

Motivation – a) Definition, b) Process of motivation, c) Types of motives, d) Motivators at workplace, e) Motivation theories (Process and Content theories)

Module 7

Interpersonal Dynamics – a) Definition, b)Psychological Contract, c) Trust and trust building, d) Prosocial behavior, e) Cooperation Vs Competition f) Conflict management, g) Levels and types of conflict at workplace, h) Conflict management Styles, i) Managing Negotiations

Module 8

Power and Leadership - a) Defining Power, b) Sources of Power, c) Organizational politics, d) Leadership e) Managers Vs Leaders, f) Trait and Type approach to leadership g) Leadership style, h) Leadership Grid, i) Contingency Theories j) Contemporary issues

Module 9

Team Dynamics – a) Groups and Teams, b) Types of Teams, c) Stages in group development, d) problems in team work (Free riding, social loafing, group think), e) Cross-cultural virtual teams.

Module 10

Organizational culture – a) Defining culture, b) levels of culture, c) cultural dimensions, d) high and low context cultures, e) Strong and weak organizational cultures, f) Expressions of organizational culture, g) Impact of culture on individuals, h) Organizational cultural change

Module 11

Organization Change – a) Change in Organizations, b)Nature of the chance process, c) Types of chance, d) Impact of change, e) Managing resistance to change, f) Organizational Development interventions

Module 12

Organizational Structure and Design – a) Basic dimensions of structure, b) Departmentalization, c) Organizational life cycle, d) Organizations as socio-technical systems, e) Organizational design and its impact on employees, f) Organizational boundary spanning

Text Books

1. Behaviour in Organizations by Jerald Greenberg and Robert A. Baron, PHI learning private Ltd, New Delhi (Ninth Edition).
2. Understanding Organizational Behaviour by Udai Pareek, Oxford University Press (Third Edition).

ORGB by Nelson, Quick and Khandelwal , Cengage Learning New Delhi (second edition).

Course Title: Environmental Sciences

Course Code: MCCSE401

Credit: 0

Topic:-

Module 1: Basic ideas of environment, basic concepts, man, society & environment, their interrelationship

Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development. (2L) Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. (1L) Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering. (2L), Biohazards, Disaster Management, Natural & Man-Made Disaster, Environmental safety.

Module 2: Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. (1L) Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. (2L) Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. (1L) Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity. (2L)

Module 3: Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause. (1L) Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems. (1L) Greenhouse effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its consequence, Control of Global warming. Earth's heat budget. (1L) Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). (2L) Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. (2L) Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. (2L) Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impactof other green-house gases, effect of ozone modification. (1L) Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference). (1L)

Module 4: Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. (2L) River/Lake/ground water pollution: River: DO, 5-day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river [deoxygenation, reaeration], COD, Oil, Greases, pH. (2L) Lake: Eutrophication [Definition, source and effect]. (1L) Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)(1L) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardnessand alkalinity, softening] Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. (2L) Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic (1L)

Module 5: Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals,

pesticides, volatile organic compounds. (2L) River/Lake/ground water pollution: River: DO, 5-day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river [deoxygenation, reaeration], COD, Oil, Greases, pH. (2L) Lake: Eutrophication [Definition, source and effect]. (1L) Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)(1L) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. (2L) Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic (1L). Soil pollution, soil quality, Oil spill pollution, Noise pollution.

Text Books:

1. M.P. Poonia& S.C. Sharma, Environmental Studies, Khanna Publishing House (AICTE Recommended Textbook – 2018)
2. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd.,1991.
3. De, A. K., "Environmental Chemistry", New Age International

Course Title: ESP – IV

Course Code: HSMC-CSE402

Credit: 0.5

Topic:-

Module 1

Laws of Society:

Central Legislative System of India, State Legislative System of India, Indian Judiciary

Module 2

Heritage of India:

Islam and Early Muslim Invaders, Delhi Sultanate, Bhakti and Sufi Movement.

Module 3

Know Our Country:

Rivers of India, Vegetation of India, Climate of India, Transport of India

Module 4

Revenue and Expenditure of India:

Tax System of India, Balance of Payment, Industrial Reforms

Module 5

India and World:

Monthly Current Affairs Magazine

Module 6:

Universal Human Values:

Realising existence and co-existence at all levels, Holistic perception of Harmony in existence.

Course Title: SDP – IV

Course Code: HSMC-CSE482

Credit: 0.5

Quantitative Aptitude.