MCE 3rd SEM RESOURCES

-IEEE DTU

Probability and Statistics:

S. No.	Contents	Contact Hours
1.	Descriptive statistics, Axioms on probability, Conditional probability, Addition and multiplication rules, Bayes' Theorem. Random variables: Discrete and Continuous, Probability mass and density functions, Joint marginal and conditional distributions.	8
2.	Mathematical expectation, Covariance, Variance, Moment generating function, Markov's inequality, Chebyshev's inequality. Correlation and Regression, Rank Correlation.	8
3.	Binomial, Multinomial, Poisson, Geometric, Negative binomial, Hyper geometric, Normal, Exponential, Gamma, Weibull, Erlang and Beta distributions	8
4.	Central limit theorem. Types of sampling, Parameter and statistic. Sampling distribution, Hypothesis testing, Sampling of attributes and variables, Tests of significance for large sample testing.	8
5.	Exact sampling distributions: Chi-square, Student's t, Snedecor's F and their applications. ANOVA: one and two-way classification.	8

Playlists:
1)Fresources
2)Dr.Harish Garg YT:
https://youtube.com/playlist?list=PLO-6jspot8ALyrofp0fWp0fOb19NcFS4V&si=s6s1Nn8Gi58JTnz8
(Harish Garg's videos are long but I would recommend them especially for units 3, 4 and 5. For unit 1 and 2 you can watch the videos of Gajendra Purohit or Harish Garg whichever suits you)

Books: HC Taneja

Notes:
1)Go through Ramesh Sir's class notes
2) https://drive.google.com/file/d/13Plj1WBmdN-EV6BkWuRgp1UtIs5inZci/view?usp=sharing

Note: Please note that solve all the assignments for PnS as a lot of the questions are repeated from the assignments int mte and ete. Go through the definition-based questions in PYQs, 1 definition will be asked in the ETE. Also, in ETE unit 4 and 5 will have a **very very high** weightage. Also unit 1,2 & 4,5 are interlinked.

Real Analysis:

S. No.	Contents	Contact hours
1.	Real number system $\mathbb{R}$, Peano's Postulate/Axiom, countable and uncountable sets, concepts of bounds, least upper bound & greatest lower bound, order and completeness properties of $\mathbb{R}$, Archimedean property of real numbers.	8
2.	Definition of real sequence, sub-sequence, bounded sequence, convergence of a sequence (Limit of a sequence), monotone sequences and their convergence, operations on convergent and divergent sequences, Bolzano-Weierstrass theorem for sequences, Cauchy sequence, Cauchy's general principle for convergence, Nested intervals.	9
3.	Definition and examples of Metric Spaces, limits of functions in a metric space, Pseudo metric space, Euclidean space, continuity of functions, open and closed spheres, open sets, closed sets, closure, inverse image of an open or a closed set, convergent sequences in metric space.	9
4.	Cluster points, Convergent sequences in metric space, Cauchy sequence in a metric space, Neighbourhood.	8
5.	Concept of set of measure zero, Riemann sums, Riemann integral, criterion for integrability, properties of Riemann integral, fundamental theorem of calculus.	8
	Total	42

Notes:
1) Class notes by Neokant Sir or Lipi Ma'am or any Prof taking your class
2) https://drive.google.com/drive/folders/14-V4rpc17pldQamtuf9pIdkqTNwz3Kwv?usp=sharing

Note: This subject is theoretical, moreover in exams you would have to write the proofs discussed in class (different proof might not fetch you marks) so don't watch YouTube videos for it just make notes and go through them thoroughly. You won't be needing any books either. If you read a proof a couple of times and try to understand the logic you will easily understand the proofs and the need to memorize stuff for this subject will be minimalized. Named theorems are very important.

Data Structure:

S. No.	Contents	Contact Hours
1.	**Introduction:** Introduction to Algorithm, Complexity- Time-Space Trade off. Introduction to abstract data types, design, implementation and applications. Introduction to List data structure. **Arrays and Strings:** Representation of Arrays in Memory: one dimensional, Two dimensional and Multidimensional, Accessing of elements of array, performing operations like Insertion, Deletion and Searching. Sorting elements of arrays. Strings and String Operations. **Stacks and Queues:** Introduction to data structures like Stacks and Queues. Operations on Stacks and Queues, Array representation of Stacks Applications of Stacks: recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.	10
2.	**Linked Lists:** Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching, Applications of Linked List. Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list.	6
3.	**Trees:** Basic Terminology, Binary Trees and their representation, binary search trees, various operations on Binary search trees like traversing, searching, Insertion and Deletion, Applications of Binary search Trees, Complete Binary trees, Extended binary trees. General trees, AVL trees, Threaded trees, B trees, B+ trees.	8
4.	**Sorting:** Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting.	7
5.	**Graphs:** Terminology and Representations, Graphs & Multi-graphs, Directed Graphs, Representation of graphs and their Transversal, Spanning trees, shortest path and Transitive Closure, Activity Networks, Topological Sort and Critical Paths.	7
6.	**File Structure:** File Organization, Indexing & Hashing, Hashing Functions, Collision Resolution Techniques.	4

Playlist: Jenny's Lecture's, Abdul Bari, Fresources
Notes:
1)Go through Sumedha Ma'am's notes
2)https://drive.google.com/drive/folders/1xRC8TaAM7w27oBogphLiNQYIEW55Xgdb?usp=sharing

Note: Questions solved in Sumedha Ma'am's class, Assignments, PYQs will be sufficient.

DBMS:

S. No.	Contents	Contact hours
1.	Introduction: Database system concepts and its architecture, Data models, schema and instances, Data independence and data base language and interface, Data definition languages, DML Data modeling using Entity Relationship Model: ER model concept, notation for ER diagrams mapping constraints, Keys, Concept of super key, candidate key, primary key generalizations, Aggregation, transforming ER diagrams to tables, extended ER model.	8
2.	Relational Data Model and Language: Relational data model concepts, integrity constraints, Keys domain constraints, referential integrity, assertions, triggers, Database language, Relational algebra, relational calculus, domain and tuple calculus, SQL data definition queries and updates in SQL.	9
3.	Database Design: Functional dependencies, normal forms, 1NF, 2NF, 3NF and BCNF, multi-valued dependencies, fourth normal form, join dependencies and fifth normal forms, loss less join decompositions, normalization using FD, MVD and JDs.	8
4.	File Organization, Indexing and Hashing: Basic concepts, Static Hashing, Dynamic Hashing, Ordered indices, Multi-level indexes, B-Tree index files, B+-Tree index files, Buffer Management	8
5.	Transaction processing concepts: Transaction processing system, schedule and recoverability, Testing of serializability, serializability of schedules, conflict & view serializable schedule recovery from transaction failures, deadlock handling. Concurrency Control Techniques: Locking Techniques, time stamping protocols, multiple granularities and multi-version schemes.	9
	Total	42

Playlist: Gate Smashers, Knowledge Gate etc.

Notes:
1)Go through class notes of Anshul sir/ Gunjan maam
https://drive.google.com/file/d/1dYIP4K1qeOH-iKngFn7zMg1M6uZIaWPY/view?usp=drive_link

Modern Algebra:

Groups, Abelian groups, Subgroups, Centre of a group, Order of a group and an element, Cyclic groups, groups of prime order. Cayley's digraph of cyclic groups.
Permutation groups, Alternating subgroup, Important examples of groups such as S3(Symmetric group of order 6), K4 (Klein's 4 –group) and Q8 (Quaternion group) groups. Cosets, Lagrange's Theorem for finite groups, Normal subgroup, Quotient group.
Group Homomorphism, Isomorphism, Kernel of group homomorphism, Fundamental theorem of group homomorphism, Cayley's theorem.
Ring, Subring, Integral domain, Field, Ideal of a ring, Quotient ring, Ring homomorphism, Isomorphism, and some elementary properties.
Prime ideal, Maximal ideal, Ring of polynomials and their properties.

Playlist: Bhagwan Singh Vishwakarma + Gajendra Purohit + HD Mathematics

Note: some topics are there in Bhagwan Singh Vishwakarma channel and Gajendra Purohit channel so you will have to find the videos topic wise also HD Mathematics videos are good but lengthy.

Notes:
1) Go through Dinesh sir's notes

Books:
Schaum series (Mainly refer to it for all available topics) + Joseph A. Gallian/ I. N. Herstein(for remaining topics)

Gallian PDF & notes:
https://drive.google.com/drive/folders/12uc26F-X_282cq7EhKFf3Y3PxHvKdChv?usp=sharing

Drive Folder of all available notes and computer fundamentals:

https://drive.google.com/drive/folders/1W54zNc7ptiZ2dBlHj5-cPo7PP3cvxab8?usp=sharing