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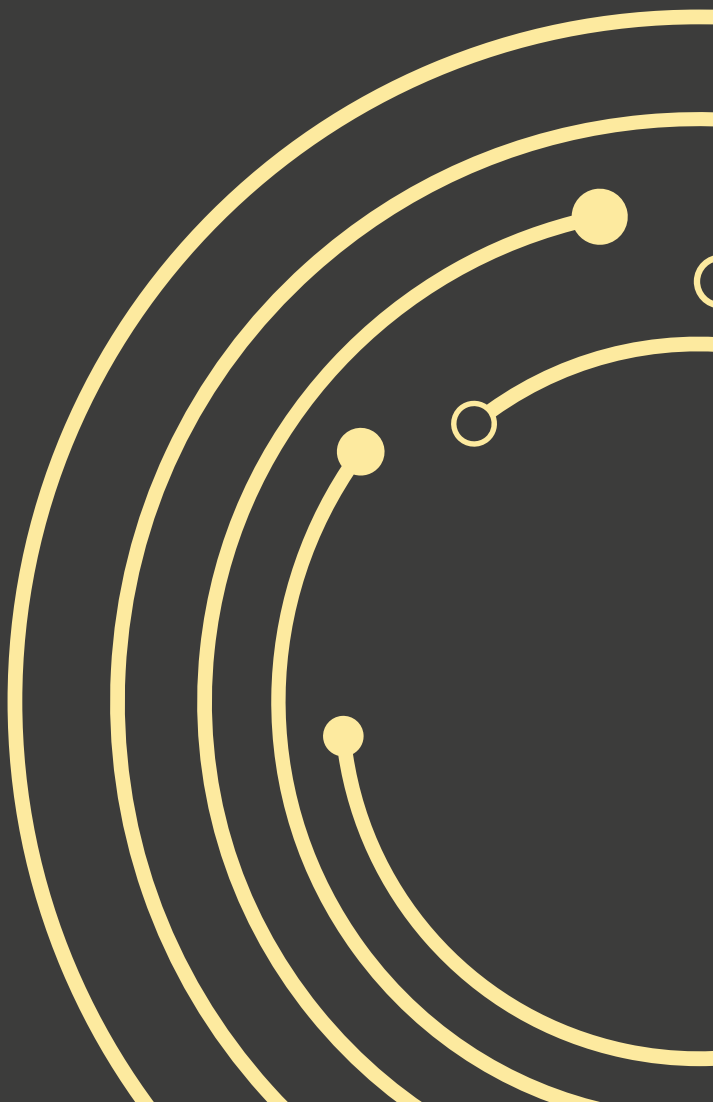
GATE DA 2024 Resources and Strategy



A STEP-BY-STEP GUIDE

This ebook contains all the free resources, along with a strategy required to crack GATE DA 2024.

About Us

DeepwizAI is a dedicated team of highly skilled IITians with a singular mission: to empower and guide students in excelling in the GATE Data Science and Artificial Intelligence (DA) exam in 2024. With their deep understanding of the subject matter and a passion for teaching, DeepwizAI brings together the best of both worlds. Their commitment to providing top-tier education, coupled with their first-hand experience of navigating the complexities of the GATE exam, makes them an invaluable resource for aspiring candidates. Through their comprehensive study materials, expert guidance, and personalized support, DeepwizAI is poised to play a pivotal role in shaping the success stories of future GATE DA 2024 achievers.

To reach out to us, drop us a mail at deepwizai@gmail.com. You can also reach out to us via LinkedIn and Instagram.

Join our Whatsapp community to practice everyday.

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CHAPTER N.1

What is GATE DA 2024 exam?

GATE Data Science and Artificial Intelligence (DA) 2024 overview

What is GATE DA 2024 exam?

The GATE Data Science and Artificial Intelligence (DA) 2024 exam is a 3-hour qualification exam for admission to M.Tech, MS, and PhD programs in Data Science at prestigious institutions like IITs, IISc, and NITs. It follows the GATE format and is being conducted for the first time, providing a unique opportunity to join the elite ranks of data science professionals in the country. The GATE rank obtained in this exam is valid for three years from the date of result declaration.

HOW CAN WE EXCEL IN GATE DA 2024?

To achieve a good rank in the GATE DA 2024 exam, we should follow these steps:

1. **Understand the Syllabus**: Begin by thoroughly comprehending the GATE DA 2024 syllabus. This is the foundation of our preparation.

2. **Resource Collection**: Based on the syllabus, gather the necessary study materials and resources, including textbooks, online courses, and reference materials.

3. **Create a Study Plan**: Develop a well-structured study plan for the next 4 months. This plan should include a daily or weekly study schedule, allocating time for each topic or subject.

4. **Practice Regularly**: Consistent practice is key. Allocate time for regular practice sessions, solving previous year's question papers, and taking mock tests to assess our progress.

5. **Revision Strategy**: Incorporate a revision strategy within the study plan to revisit previously covered topics periodically. This helps reinforce our understanding and retention.

6. **Seek Guidance**: If needed, consider seeking guidance from mentors, teachers, or online forums to clarify doubts and gain insights into effective preparation strategies.

By following these steps, we can increase our chances of achieving a good rank in the GATE DA 2024 exam.

ELIGIBILITY CRITERIA AND REQUIRED DOCUMENTS

Eligibility Criteria and Required Documents for GATE DA 2024 Exam:

Eligibility:

1. Applicants should be in their third year or beyond of an undergraduate degree or have completed a government-sanctioned program in Engineering, Technology, Science, Architecture, or Humanities.
2. Applicants from countries other than India must be in their third year or beyond or have completed a Bachelor's program lasting at least three years in the mentioned fields.

General Information Required for Form Fillup:

1. Name and address of the candidate as per government ID.
2. Eligibility degree details, e.g., B.Tech third-year marksheet.
3. Paper code, e.g., DA for Data Science & Artificial Intelligence.
4. Selection of THREE choices of GATE examination cities (from the same zone).
5. Net-banking/Debit card/Credit card/UPI/wallet details for fees.

Required Documents for Form Fillup:

1. High-quality image of the candidate's photograph.
2. High-quality image of the candidate's signature.
3. Scanned copy of Category certificate in pdf format (if applicable).
4. Scanned copy of Certificate of Dyslexia (if applicable).
5. Scanned copy of valid photo Identity document (e.g., Aadhar).

Please note that the last date for form fillup is **29th September 2023**. Ensure you have all the necessary documents and information ready before proceeding with the application.

CHAPTER N.2

Common topics of *GATE DA* with GATE CS and GATE Statistics paper

Deep dive syllabus analysis

GATE New Test Paper on Data Science and Artificial Intelligence(DA)

Syllabus

Probability and Statistics: Counting (permutation and combinations), probability axioms, Sample space, events, independent events, mutually exclusive events, marginal, conditional and joint probability, Bayes Theorem, conditional expectation and variance, mean, median, mode and standard deviation, correlation, and covariance, random variables, discrete random variables and probability mass functions, uniform, Bernoulli, binomial distribution, Continuous random variables and probability distribution function, uniform, exponential, Poisson, normal, standard normal, t-distribution, chi-squared distributions, cumulative distribution function, Conditional PDF, Central limit theorem, confidence interval, z-test, t-test, chi-squared test.

Linear Algebra: Vector space, subspaces, linear dependence and independence of vectors, matrices, projection matrix, orthogonal matrix, idempotent matrix, partition matrix and their properties, quadratic forms, systems of linear equations and solutions; Gaussian elimination, eigenvalues and eigenvectors, determinant, rank, nullity, projections, LU decomposition, singular value decomposition.

Calculus and Optimization: Functions of a single variable, limit, continuity and differentiability, Taylor series, maxima and minima, optimization involving a single variable.

Programming, Data Structures and Algorithms: Programming in Python, basic data structures: stacks, queues, linked lists, trees, hash tables; Search algorithms: linear search and binary search, basic sorting algorithms: selection sort, bubble sort and insertion sort; divide and conquer: mergesort, quicksort; introduction to graph theory; basic graph algorithms: traversals and shortest path.

Database Management and Warehousing: ER-model, relational model: relational algebra, tuple calculus, SQL, integrity constraints, normal form, file organization, indexing, data types, data transformation such as normalization, discretization, sampling, compression; data warehouse modelling: schema for multidimensional data models, concept hierarchies, measures: categorization and computations.

Machine Learning: (i) Supervised Learning: regression and classification problems, simple linear regression, multiple linear regression, ridge regression, logistic regression, k-nearest neighbour, naive Bayes classifier, linear discriminant analysis, support vector machine, decision trees, bias-variance trade-off, cross-validation methods such as leave-one-out (LOO) cross-validation, k-folds cross-validation, multi-layer perceptron, feed-forward neural network; (ii) Unsupervised Learning: clustering algorithms, k-means/k-medoid, hierarchical clustering, top-down, bottom-up: single-linkage, multiple-linkage, dimensionality reduction, principal component analysis.

AI: Search: informed, uninformed, adversarial; logic, propositional, predicate; reasoning under uncertainty topics - conditional independence representation, exact inference through variable elimination, and approximate inference through sampling.

Topics also present in GATE CS paper

Topics also present in GATE Statistics paper

To demystify the GATE DA syllabus, we analysed the syllabus(as on official website) to identify areas where we can leverage existing question papers from other subjects. Upon examination, we observe substantial overlap between the GATE DA syllabus and GATE CS, as indicated by yellow highlights. Additionally, there are minor overlaps with the GATE statistics paper, denoted by blue highlights. For these common topics, we can directly access and study previous year GATE questions. However, for the remaining subjects, it's crucial to identify accurate resources that comprehensively cover these topics at the GATE level.

CHAPTER N.3

Free resources for GATE DA

Resources and topics covered in GATE DA

Free resources for GATE DA

In this section, you will find valuable free resources covering all the subjects included in the GATE DA syllabus. We strongly recommend using these resources for your preparation, as they have been carefully selected to provide comprehensive and reliable guidance.

GATE 30 YEARS PREVIOUS YEAR QUESTIONS BOOK

A comprehensive GATE book containing previous 30 years' questions is an invaluable resource for anyone preparing for the GATE exam. Such a book not only serves as a repository of past exam papers but also offers subject-wise questions with detailed explanations. Practising with this book is crucial because it allows aspirants to familiarise themselves with the exam pattern, question types, and the level of difficulty that GATE typically presents. Repetition is key, and completing this book 2-3 times before appearing for the GATE exam can significantly enhance one's problem-solving skills and overall readiness.

PROBABILITY & STATISTICS

Where to study from?

To prepare effectively for the Probability and Statistics topics in the GATE DA exam, we recommend utilizing various educational resources available online. For a solid foundation in probability, including concepts like permutations, combinations, probability axioms, sample space, and events, you can benefit from Kiran sir's YouTube lectures. Kiran sir is an experienced educator with over 20 years of teaching experience and a Masters degree from IISc. His free YouTube lectures not only provide in-depth explanations but also include practice sessions with previous GATE questions.

For more advanced probability topics such as conditional probability, random variables, Bayes' theorem, and various distributions like the normal and binomial distributions, you should explore the NPTEL YouTube playlist by Prof G. Srinivasan at IIT Madras. This structured course offers a comprehensive understanding of these concepts. To enhance your clarity further, consider checking out StatQuest by Josh Stramer, known for his effective explanations of complex topics, including those related to machine learning.

To excel in statistics, begin with Khan Academy's Statistics playlist, which covers fundamental concepts like mean, median, mode, and standard deviation. Progress to topics like conditional expectation, variance, correlation, and covariance. Study discrete random variables, probability mass functions, and distributions like uniform, Bernoulli, and binomial. Move on to continuous random variables and probability distribution functions, including uniform, exponential, Poisson, normal, standard normal, and t-distributions. Explore cumulative distribution functions, conditional PDF, and the Central Limit Theorem. Finally, delve into confidence intervals, z-tests, t-tests, and chi-squared tests. Khan Academy, founded by Sal Khan, offers world-class education for free and is an excellent resource to master these statistical concepts.

Summary and Resource links

Sub-topic	Resource Links	Direction
Counting (permutation and combinations), probability axioms, Sample space, events, independent events, mutually exclusive events	Kiran Kumar	Lectures 1 to 12
Probability introduction, conditional probability, random variables, bayes theorem, normal distribution, binomial distribution	NPTEL Statquest Proba Statquest Bayes	Lectures 12 to lecture 21 (NPTEL), use Statquest for reference
Covariance and correlation	Covariance Correlation	
Conditional expectation and variance, mean, median, mode and standard deviation, correlation, and covariance, random variables, discrete random variables and probability mass functions, uniform, Bernoulli, binomial distribution, Continuous random variables and probability distribution function, uniform, exponential, Poisson, normal, standard normal, t-distribution, chi-squared distributions, cumulative distribution function, Conditional PDF, Central limit theorem, confidence interval, z-test, t-test, chi-squared test.	Khan academy	Full playlist

LINEAR ALGEBRA

Where to study from?

To excel in the Linear Algebra section of the GATE DA exam, we strongly recommend studying the materials and lectures by Professor Gilbert Strang. His extensive experience of 61 years as a professor at MIT teaching Linear Algebra makes him an invaluable resource. Start by understanding the fundamental concepts of vector spaces, subspaces, and the notions of linear dependence and independence among vectors. Dive into matrices, their properties, and the crucial concepts of projection, orthogonal, and idempotent matrices. Explore partition matrices and their properties, and delve into quadratic forms and systems of linear equations, including methods like Gaussian elimination for solutions. Gain a deep understanding of eigenvalues and eigenvectors, determinants, rank, nullity, projections, LU decomposition, and singular value decomposition. Professor Strang's lectures will provide a comprehensive foundation in these topics, ensuring your success in the GATE DA exam.

Summary and Resource links

Sub-topic	Resource Links	Direction
Vector space, subspaces, linear dependence and independence of vectors, matrices, projection matrix, orthogonal matrix, idempotent matrix, partition matrix and their properties, quadratic forms, systems of linear equations and solutions; Gaussian elimination, eigenvalues and eigenvectors, determinant, rank, nullity, projections, LU decomposition, singular value decomposition.	Gilbert Strang	Lectures 1 to 22

CALCULUS & OPTIMIZATION

Where to study from?

To prepare for the topics of Calculus for the GATE DA exam, start by studying functions of a single variable. Understand how functions work, and learn about different types of functions like linear, quadratic, exponential, and trigonometric functions. Next, delve into the concepts of limit, which deals with the behavior of functions as they approach certain values. Focus on continuity and differentiability, which involve understanding when a function is smooth and can be differentiated. To gain a deeper understanding, watch Khan Academy YouTube lectures or consult a standard engineering book like B.S. Grewal for comprehensive explanations and examples. Study Taylor series, which helps in approximating functions using polynomials. Learn about maxima and minima, where you analyze the highest and lowest points of a function, crucial for optimization problems. Lastly, practice optimization involving a single variable, which involves finding the maximum or minimum values of functions in various real-world scenarios.

Summary and Resource links

Sub-topic	Resource Links	Direction
Functions of a single variable, limit, continuity and differentiability, Taylor series, maxima and minima, optimization involving a single variable.	Khan Academy	All lectures
B.S.Grewal Maths book (for reference)	Book link	

PROGRAMMING IN PYTHON

Where to study from?

To prepare for the Python section in the GATE DA exam, Mosh Haemedani's YouTube channel is an excellent resource. With over 3.51 million subscribers, he is a trusted tutor for Python programming basics. While the most effective way to learn is through hands-on practice, you can also utilize his Python tutorial playlist as a valuable reference. His tutorials simplify complex concepts, making it easier for students to grasp Python fundamentals. Watching his videos and practicing alongside them will help you build a solid foundation in Python, which is essential for success in the GATE DA exam.

Summary and Resource links

Sub-topic	Resource Links	Direction
Programming in Python	Mosh Python tutorial	All lectures

DATA STRUCTURES

Where to study from?

To excel in the Data Structures section of the GATE DA exam, start by exploring the comprehensive resources available. I recommend checking out Kiran Kumar's playlist and Ravindrababu Ravula's playlist, both of whom are highly experienced instructors (holding Masters degree from IISc) with over 20 years of expertise in GATE CSE teaching. Begin with the fundamentals, including stacks, queues, linked lists, trees, and hash tables. Understand the core concepts of search algorithms, such as linear search and binary search. Familiarize yourself with basic sorting techniques like selection sort, bubble sort, and insertion sort. Delve into the divide and conquer approach, grasping the principles of mergesort and quicksort. Additionally, introduce yourself to graph theory and its basic algorithms, including traversals and shortest path calculations.

Summary and Resource links

Sub-topic	Resource Links	Direction
Stacks, queues, linked lists, trees, hash tables; Search algorithms: linear search and binary search, basic sorting algorithms: selection sort, bubble sort and insertion sort; divide and conquer: mergesort, quicksort; introduction to graph theory; basic graph algorithms: traversals and shortest path.	Kiran Kumar Ravula	Kiran Kumar: Follow these lectures 1-8, 49-87, 111-129 Ravula: Lecture 1-14

DATABASE MANAGEMENT & WAREHOUSING

Where to study from?

To prepare for the DBMS topics for the GATE DA exam, it is highly recommended to access Kiran Kumar's playlist, which offers the best and most accessible guidance. Mr. Kumar, hailing from IISc and boasting more than two decades of GATE CSE teaching experience, provides a comprehensive approach to various topics. Begin with the ER-model and relational model, including relational algebra and tuple calculus. Next, delve into SQL and its various aspects. Pay close attention to integrity constraints and understand their significance. Move on to mastering the concepts of normal form, file organization, and indexing. Don't forget to grasp data types and data transformation, particularly through techniques like normalization.

Summary and Resource links

Sub-topic	Resource Links	Direction
ER-model, relational model: relational algebra, tuple calculus, SQL, integrity constraints, normal form, file organization, indexing, data types, data transformation such as normalization,	Kiran Kumar	All lectures

MACHINE LEARNING

Where to study from?

To prepare for the Machine Learning topics in the GATE DA exam, follow these steps in a systematic manner. First, start with supervised learning, which includes regression and classification problems. Begin by understanding simple linear regression, where you predict values based on a single input. Then, delve into multiple linear regression, which handles multiple input variables. Explore advanced techniques like ridge regression, logistic regression, k-nearest neighbor, naive Bayes classifier, linear discriminant analysis, support vector machine, decision trees, and the concept of bias-variance trade-off. Don't forget to grasp essential validation methods such as leave-one-out (LOO) cross-validation and k-folds cross-validation.

For a comprehensive understanding, follow the Statquest lectures by Josh Stramer from lectures 1 to 84. These videos simplify complex concepts and are an excellent starting point. Additionally, Andrew Ng's Stanford class lectures offer valuable insights into machine learning. Lastly, enhance your knowledge by watching NPTEL lectures by Prof. Dr. Sudeshna Sarkar from IIT Kharagpur. These renowned experts provide diverse perspectives on the same topics, aiding your comprehension. By studying across these three resources, you'll be well-prepared for the GATE DA exam's supervised learning component.

Moving on to unsupervised learning, cover clustering algorithms like k-means and k-medoid. Understand hierarchical clustering, including the top-down and bottom-up approaches such as single-linkage and multiple-linkage methods. Lastly, master dimensionality reduction techniques like principal component analysis. Apply the same approach by studying these topics across the three recommended resources: Statquest, Andrew Ng's Stanford lectures, and NPTEL lectures by Prof. Dr. Sudeshna Sarkar. This multi-source approach ensures a well-rounded understanding of unsupervised learning for the GATE DA exam.

Summary and Resource links

Sub-topic	Resource Links	Direction
(i) Supervised Learning: regression and classification problems, simple linear regression, multiple linear regression, ridge regression, logistic regression, k-nearest neighbour, naive Bayes classifier, linear discriminant analysis, support vector machine, decision trees, bias-variance trade-off, cross-validation methods such as leave-one-out (LOO) cross-validation, k-folds cross validation, multi-layer perceptron, feed-forward neural network; (ii) Unsupervised Learning: clustering algorithms, k-means/k-medoid, hierarchical clustering, top-down, bottom-up: single-linkage, multiple linkage, dimensionality reduction, principal component analysis.	Statquest Andrew Ng Stanford class lectures NPTEL	Statquest: Lectures 1 to 84 Andrew Ng: Lecture 1 to 13 NPTEL: All lectures

AI

Where to study from?

To prepare for the AI topics in the GATE DA exam, start by focusing on the fundamentals of search algorithms. Learn about informed and uninformed search methods, which help in finding solutions efficiently. Additionally, delve into adversarial search, which deals with strategic decision-making in competitive scenarios.

Next, move on to logic, which is crucial in AI. Understand propositional logic, which deals with statements and their truth values, and predicate logic, which deals with relationships and quantifiers.

For reasoning under uncertainty, explore conditional independence representation, which helps simplify complex probability distributions. Learn about exact inference through variable elimination, which is a method for calculating probabilities in graphical models. Also, grasp the concept of approximate inference through sampling, which is used when exact solutions are computationally expensive.

For comprehensive study materials, refer to NPTEL lectures by Prof. Shyamanta M. Hazarika from IIT Guwahati and NPTEL lectures by Prof. Mausam from IIT Delhi. These resources will serve as your primary references for mastering these AI topics.

Summary and Resource links

Sub-topic	Resource Links	Direction
Search: informed, uninformed, adversarial; logic, propositional, predicate; reasoning under uncertainty topics - conditional independence representation, exact inference through variable elimination, and approximate inference through sampling.	NPTEL IITG NPTEL IITD	NPTEL IITG: Lectures 1-19 NPTEL IITD: All Lectures

CHAPTER N.4

Strategy – A four month plan to crack GATE DA

Strategy – A four month plan to crack GATE DA

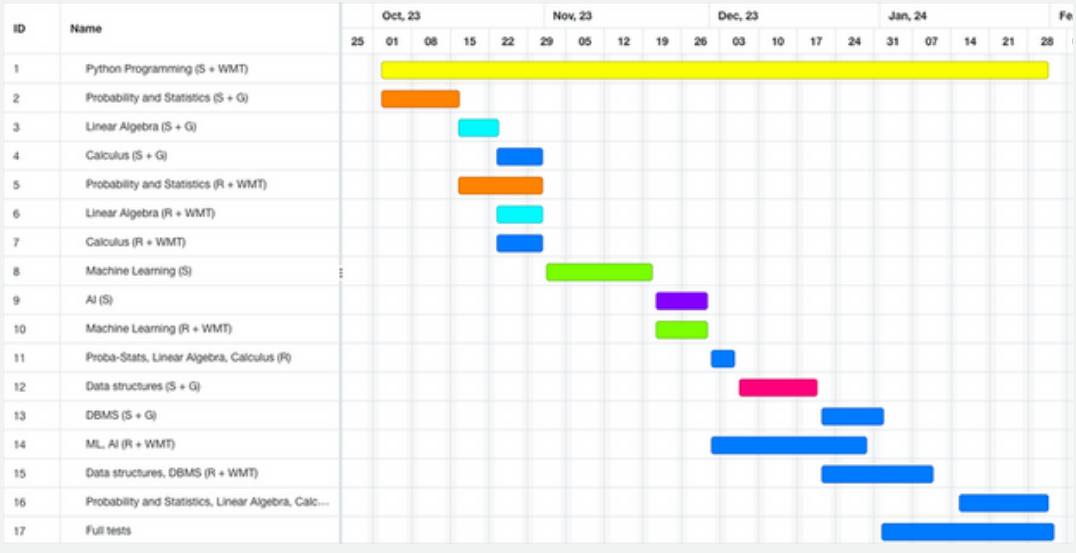
Overview

To prepare effectively for the GATE DA (Data Analytics) exam, follow this organized plan. In October, concentrate on probability, statistics, linear algebra, and calculus. These subjects have substantial overlap with GATE CS and GATE statistics, so practice previous year questions diligently. Simultaneously, take 2-3 mock tests from reputable institutes to adapt to the time-bound answering format.

In November, immerse yourself in Machine Learning and AI, while continuing to take mock tests. Dedicate time to review all subjects covered in October. Maintain a weekly routine of mock tests for probability, linear algebra, and calculus to stay sharp.

December should revolve around Data Structures and Database Management Systems (DBMS). Thoroughly practice previous GATE CS questions related to these topics. By this point, you should have covered all the necessary subjects for GATE DA.

Once you've completed 70-80% of the syllabus, start taking full-length tests from various institutes to acclimate yourself to the exam environment. Aim for a score of around 80 or higher in these tests. Throughout these four months, focus on hands-on experience with Python programming by regularly taking mock tests, as it requires practical skills in addition to theory. This comprehensive approach will help you excel in the GATE DA exam.



Key	Value
S	Study
G	practice previous year GATE questions
R	Revision
WMT	Weekly mock test from 2-3 reputed institutes

This Gantt chart presents the plan one should use.

Plan in tabular form

Topics	Direction	Completion Date
Programming with Python	Study + weekly mock test from 2-3 reputed institutes	October 1 - January 31
Probability and Statistics	Study + practice previous year GATE questions	October 1 - 15
Linear Algebra	Study + practice previous year GATE questions	October 15 - 21
Calculus	Study + practice previous year GATE questions	October 21 - 31
Probability and Statistics	Revise + Practise weekly mock test from 2-3 reputed institutes	October 15 - 31
Linear Algebra	Revise + Practise weekly mock test from 2-3 reputed institutes	October 21 - 31
Calculus	Revise + Practise weekly mock test from 2-3 reputed institutes	October 21 - 31
ML	Study + practice questions	November 1 - 20
AI	Study + practice questions	November 21- 30
ML	Revise + Practise weekly mock test from 2-3 reputed institutes	November 21 - 30
Probability and Statistics, Linear Algebra, Calculus	Revise	December 1 - 5
Data structures	Study + practice previous year GATE questions	December 6 - 20
DBMS	Study + practice previous year GATE questions	December 21 - 31
ML, AI	Revise + Practise weekly mock test from 2-3 reputed institutes	December 1 - 31
Data structures	Revise + Practise weekly mock test from 2-3 reputed institutes	December 21 - 31
DBMS	Revise + Practise weekly mock test from 2-3 reputed institutes	Jan 1 - 10
Probability and Statistics, Linear Algebra, Calculus, ML, AI, Data structures, DBMS	Revise	Jan 15 - Jan 31
Full tests	As many as possible, from 2-3 reputed institutes	Jan 1 - Jan 31

CHAPTER N.5

Conclusion

Final remarks

Conclusion

Concluding remarks

In conclusion, the purpose of this eBook was to provide aspiring students with a clear and effective roadmap to conquer the GATE DA exam. We have strived to offer a comprehensive strategy, supported by free resources, that empowers you to succeed within the confines of a time-bound schedule.

Throughout this eBook, we have outlined the key principles, study materials, and time management techniques necessary to excel in the GATE DA exam. Our goal has been to simplify the complex and to offer guidance in a manner that is easy to grasp and apply.

Remember, success in any endeavour requires dedication, consistency, and hard work. The resources and strategies provided here are tools to aid you in your journey, but it is your commitment that will ultimately determine your triumph.

As you embark on your preparation for the GATE DA exam, keep faith in your abilities and stay focused on your goals. With the right plan and unwavering determination, you can achieve the success you aspire to. Best of luck in your endeavours, and may this eBook be a valuable companion on your path to success.