# Effective Preparation Strategy for GATE
# (One year Plan)

By :

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AIR – 06 (GATE – Electronics)

# Introduction to Educator

## Chetan Ambekar

I am Masters from NITIE, Mumbai in Analytics.

Among the toppers of Electronics Engineers from University of Mumbai

Faculty of GATE/PSU Exam Preparation since 3.5 years.

AIR GATE Rank – 6 ( Electronics)

GATE Score (924/1000)

Cracked IIT Bombay M. Tech Interview for Communication Systems/ Electronics Systems, VLSI /NITIE Interview,

Author/Reviewer of various Research Articles & Conferences on IEEE/Springer etc.

My Hobbies: Chess, Cooking & big time Foodie

Find me on: https://unacademy.com/user/ciambekar

**Feel free to contact for any help regarding GATE/IES/PSU/ Engineering/MBA**

# It's Possible if you follow right Methods!

- Why GATE
- What is GATE
- Importance of GATE
- What after GATE
- Opportunities after GATE
- What one should do!

# Exam Pattern

- In GATE 2019 ECE question paper, candidates will have to answer 65 questions in online mode.
- Candidates will be given 3 hours to complete the question paper.
- The question paper of GATE 2019 will carry Multiple Choice Questions (MCQ's) (Approximate 30) and Numerical Answer Types (NAT's) question(35 Questions).
- MCQ's will have negative marking($1/3^{rd}$ of the marks assigned), while there will be no negative marking for NAT's.
- Candidates should use the virtual Scientific Calculators.

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# THANK YOU

**RATE** **RECOMMEND** **REVIEW**

**Feel free to contact for any help regarding GATE/IES/PSU**

# Syllabus

- Subjects from 2nd Year, 3rd & 4th Year of your Engineering Branch.
- Importance of Subjects
- (Signals & Systems, Control Systems, Communication Systems, Analog Electronics, EDC, Electromagnetics, Digital Electronics, Electrical Networks, Engineering Mathematics, General Verbal & Quantitative Aptitude)

# How to Prepare
# (Make Shorter Goals to get big goals)

- Schedule for GATE(Target to complete syllabus by end of December)
- Divide each Subject(10) to 8 modules each. ( Division will be discussed)
- One can get courses on each module on Unacademy platform.
- Plan to complete 2 subjects every month.
- (Plan for week & month will be discussed in the upcoming videos)

# Signals & Systems (Easy – 10 Marks) – 6 Ques

- Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.
- Unacademy Videos for Signal & Systems
- Digital Signal Processing by S.K Mitra, Modern digital and analog Communications system by BP Lathi, Signals & Systems By Alan V. Oppenheim

# Electrical Networks- (Moderate- 10 Marks)

- Network graphs: matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Solution methods: nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Steady state sinusoidal analysis using phasors. Linear constant coefficient differential equations; time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits. 2-port network parameters: driving point and transfer functions. State equations for networks.
- Network Theory by Alexander Sadiku, Circuit Theory by A.Chakraborty, Network Analysis by Van Valkenburg

# Digital Circuits – (Moderate) – (8-12 Marks)

- Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shiftregisters. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor(8085): architecture, programming, memory and I/O interfacing.
- Digital Logic and Computer Design by M.Morris Mano, Digital circuits and design by Salivahanan or Fundamentals of digital systems by Anandkumar, Digital Electronic Principles and applications by Ronald J. Toccii, Pearson Publications

# Engineering Mathematics – 15 Marks

- Linear Algebra: Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.
- Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series.
- Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.
- Differential equations: First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and boundary value problems, Partial Differential Equations and variable separable method.
- Complex variables: Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, solution integrals.
- Probability and Statistics: Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.
- Numerical Methods: Solutions of non-linear algebraic equations, single and multi-step methods for differential equations. Transform Theory: Fourier transform, Laplace transform, Z-transform.

# Electronics Devices & Circuits- (6- 10 Marks, Important & Moderate)

- Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-I-n and avalanche photo diode, Basics of LASERs. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.
- Course Link: https://unacademy.com/course/electronics-device-circuits-energy-band-charge-carriers-in-semi-conductors/WDPVQUY9
- Electronic Devices and Circuits by Millman & Halkias, Semiconductor Physics And Devices by Donald A. Neamen

# Analog Electronics –(8 to 10 Marks) – Tough

- Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single-and multi-stage, differential and operational, feedback, and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.

# Control Systems: (Easy- 10 -12 Marks)

- Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-IntegralDerivative (PID) control. State variable representation and solution of state equation of LTI control systems.
- Unacademy Video:

https://unacademy.com/course/gate-control-systems-for-eceein/KTFG2KN9

https://unacademy.com/course/polar-plots-control-systems-for-gate/JWUISMKX

https://unacademy.com/course/gate-control-systems-nyquist-plot/CXYR4N0M

- Control Systems by Nagarath and Gopal, NPTEL Video lectures by M. Gopal

# Communication Systems
# Important-(10-12 Marks) – Tough

- Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis of these operations, superheterodyne receivers; elements of hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Fundamentals of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA and GSM.
- Analog and Digital Communication System by Simon Haykin,
  Principle of Communication System by Taub& Schillings,
  Modern digital and analog Communications system by BP Lathi,

# Electromagnetics – 8 -10 Marks(Moderate)

- Electromagnetics: Elements of vector calculus: divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms. Wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; impedance matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.
- Elements of Electromagnetics by Matthew N.O. Sadiku, Electromagnetic waves and Radiating Systems by Jordon and ballmain, Antenna Theory by Balanis,
  NPTEL Lectures by Prof. R. Shevgaonkar

# General Aptitude – 15 Marks-(Easy)

- Quantitative Aptitude by R.S Agarwal
- Unacademy Videos
- MCQ Questions: by R. K. Kanodia Book for Electronics

(All Subjects GATE Questions are provided for Electronics are explained quite well)

# Plan for the month

- Select on easy/Moderate Subject & one tough according to your interest,
- Day One of the Month: Collect every possible document, books for the subjects, GATE Questions related to the subject, Notebooks.
- Mark in the syllabus the module division for each subjects.
- Devote 15 days for each subjects.
- Complete one module per day. (Module Division as explained earlier)
- At the end of each day solve GATE Question related to the subjects.
- On $15^{th}$ & $30^{th}$ of every month, give tests for the subject.

# Plan for the day

- Efficiently you should be able to give atleast 6 hours Full time for GATE.
- Start your study with a half hour revision of the concept of the previous day.
- Divide module in individual Concepts, read from Unacademy Videos, go for the notes, reference books, solve GATE Questions.
- Solve atleast 50 GATE Questions/ Day for the topic which you are reading.
- After one month, this has to be increased to 100 Questions/day for a under 100 Rank.

# Plan for One Year

| S. No. | Months | Subjects |
|---|---|---|
| 1 | Month 1 | EDC, Controls Systems |
| 2 | Month 2 | Signals & Systems, Digital Electronics (Revision of EDC) |
| 3 | Month 3 | Engineering Mathematics, Electromagnetics (Revision of Controls) |
| 4 | Month 4 | Analog Electronics, Electrical Networks ( Revision of Digital & Signals Systems) |
| 5 | Month 5 | Communication System, General Ability (Revision of Analog, Networks) |
| 6 | Month 6 | Full Length Test(At least 20), Revision followed by tests |

# How to Make Effective Notes

- Highlight important points in the syllabus sheets, use codes as (Exam) before questions that are highly important.
- Leave two pages at the start of every module to note down important formulae & results.
- (8 Modules/ subjects ) – 80x2 = 160 pages of very important notes.
- Pause the Unacademy Videos and then note the points for high utilization of video content
- Note the mistakes from the test regularly

# How to revise!

- Revision to be done everyday of the concepts read yesterday
- Devote at least 1 hour for Revision( half hour in the start & half at the end)
- Strategy of 160 Pages Revision
- Give Tests on every third day of all the three modules studied & revise from the mistakes
- Revise mistakes from the tests, regularly.

# Importance of Tests

- Very Important technique to get self- realizations & motivation
- Give tests on every third day for all the three modules. Attempt will be made to provide the test questions on my page for Questions https://unacademy.com/user/ciambekar
- If any doubts are there, they will be discussed in form of Videos
- Give at least two test for the complete subject on every $15^{th}$ & $30^{th}$ of the month.
- Give at least 20 full length test for the complete syllabus in December & January.
- Give all your tests aligned to the actual timing of the GATE – Exam

# One day before the exam

- Read & understand all the 160 pages (before the modules), formulae understanding.
- Don't solve or read any new concept.
- Revise all the tests that are submitted.
- Have a silent mind.
- Have a proper sleep.

# Golden Rule for a good rank

- Read Concise & from one book, make proper notes.
- Follow the 160 pages strategies
- Give at least 20 Full Length Test
- Complete one module every day.
- Solve at least 50 Questions per day, if possible 100 Questions/day.
- The more you solve, the closer you are to AIR 1

# How to Manage College & Final Year Project

- One would enough time to submit the final year project after GATE.
- Provide a suitable day in the week & work for at most 3-4 hours for Project.
- College studies should be done along with GATE, priorities should be cleared.
- Timings should be cleared foe the same.
- Try to align the college semester subjects with GATE Reading

# How to manage during College Placements

- Students should align the subjects like General Ability during Placement
- Learning of GATE will definitely help for the Technical GD's & Technical Interviews for Placements.
- Don't get dishearten & be ready for rejections. At the same time, always try to get the process done as fast as possible. Don't disconnect yourself from GATE Prep.
- Try to sleep not more than 6 hours for next 6 months.
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# Common Mistakes in GATE

- Students fill form & doesn't prepare for the exam
- Students doesn't have the patience to read questions carefully.
- (Example: Not reading constants in the Questions)
- Unable to prioritize College Study with GATE
- Student think a lot about what he will get after GATE.
- Pressurized because of College Placements, leave GATE preparation.
- Not habitual of using Scientific Calculators

# It's Possible that you can be next AIR 1

- Enough time will be provided after GATE exam for College Projects, Final Semester Exams, for which IIT is the best, which branch will be the best.
- It requires just first class in your Bachelor Degree to get admitted for

M. Tech.

- So complete attempt should be made for making out of these valuable 6 Months.

Study hard & Trust me result will come!!