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GATE
Practice Booklet

Bits & Bytes

VOLUME - II

ELECTRONICS & COMMUNICATION ENGINEERING

1116 Expected Questions with Solutions

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Foreword

Dear Students,

Solutions of all previous GATE Questions are already available. Every year about 20% of questions will have repetitive nature. However, rest of the questions are from untapped areas (never asked areas) and few from Previous Engineering Services & Civil Services Questions. Keeping this in view, possible questions are prepared in various subjects (chapter wise) along with their hints/solutions. The student is advised to practice the questions systematically so that their chances of getting high score in GATE Exam will increase.

The student is advised to solve the problems without referring to the solutions. The student has to analyze the given question carefully, identify the concept on which the question is framed, recall the relevant equations, find out the desired answer, verify the answer with the final key such as (a), (b), (c), (d), then go through the hints to clarify his answer. This will help to face numerical answer questions better. The student is advised to have a standard text book ready for reference to strengthen the related concepts, if necessary. The student is advised not to write the solution steps in the space around the question. By doing so, he loses an opportunity of effective revision.

As observed in the GATE Exam, number of sets may be possible, being online exams. Hence, don't skip any subject. All are equally important.

It is believed that this book is a Valuable aid to the students appearing for competitive exams like IES, ISRO and Other PSU's. This book can also be used by fresh Teachers in Engineering in improving their Concepts.

With best wishes to all those who wish to go through the following pages.

Y.V. Gopala Krishna Murthy,
M Tech. MIE,
Chairman & Managing Director,
ACE Engineering Academy,
ACE Engineering Publications,
Frost Interactive Service Pvt. Ltd. (ACE ONLINE).

Syllabus for Electronics and Communication Engineering

Electronic Devices

Energy bands in intrinsic and extrinsic semiconductors, equilibrium carrier concentration, direct and indirect band-gap semiconductors.
Carrier transport: diffusion current, drift current, mobility and resistivity, generation and recombination of carriers, Poisson and continuity equations.
P-N junction, Zener diode, BJT, MOS capacitor, MOSFET, LED, photo diode and solar cell.

Electromagnetics

Maxwell's equations: differential and integral forms and their interpretation, boundary conditions,wave equation, Poynting vector.
Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth.
Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, Smith chart.
Rectangular and circular waveguides, light propagation in optical fibers, dipole and monopole antennas, linear antenna arrays.

Communications

Random processes: autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI systems.
Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, super heterodyne receivers.
Information theory: entropy, mutual information and channel capacity theorem.
Digital communications: PCM, DPCM, digital modulation schemes (ASK, PSK, FSK, QAM), bandwidth, inter-symbol interference, MAP, ML detection, matched filter receiver, SNR and BER.
Fundamentals of error correction, Hamming codes, CRC.

Engineering Mathematics

Linear Algebra: Vector space, basis, linear dependence and independence, matrix algebra, eigenvalues and eigenvectors, rank, solution of linear equations- existence and uniqueness.
Calculus: Mean value theorems, theorems of integral calculus, evaluation of definite and improper integrals, partial derivatives, maxima and minima, multiple integrals, line, surface and volume integrals, Taylor series.
Differential Equations: First order equations (linear and nonlinear), higher order linear differential equations, Cauchy's and Euler's equations, methods of solution using variation of parameters, complementary function and particular integral, partial differential equations, variable separable method, initial and boundary value problems.
Vector Analysis: Vectors in plane and space, vector operations, gradient, divergence and curl, Gauss's, Green's and Stokes' theorems.
Complex Analysis: Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, sequences, series, convergence tests, Taylor and Laurent series, residue theorem.
Probability and Statistics: Mean, median, mode, standard deviation, combinatorial probability, probability distributions, binomial distribution, Poisson distribution, exponential distribution, normal distribution, joint and conditional probability.

General Aptitude

Verbal Aptitude: Basic English grammar: tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech Basic vocabulary: words, idioms, and phrases in context Reading and comprehension, Narrative sequencing

Quantitative Aptitude: Data interpretation: data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables
Numerical computation and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations, and series, Mensuration and geometry, Elementary statistics and probability
Analytical Aptitude : Logic: deduction and induction, Analogy, Numerical relations and reasoning
Spatial Aptitude: Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping, Paper folding, cutting, and patterns in 2 and 3 dimensions

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