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GATE – 2027

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ELECTRONICS & COMMUNICATION ENGINEERING

Previous **GATE** Questions with Solutions,
Subjectwise and Chapterwise

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Foreword

The style, quality and content of the Solutions provided for previous GATE Questions of Electronics & Communication Engineering, will encourage the readers to learn & understand the concept thoroughly and answer the questions without any difficulty or tension. However, readers comments and suggestions are always welcomed by the Academy.

The student should not miss to go through the solutions for conventional questions asked prior to 2003, as more concepts are brought out in them that will facilitate to answer the numerical answer questions, Common data and Linked answer questions , if any, easily.

The student is advised to solve the problems without referring 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 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 lose an opportunity of effective revision.

It is believed that this book is a valuable aid to the students appearing for competitive exams like ESE, ISRO and Other PSU's. This book can also be used by fresh Teachers who are into Engineering teaching to improve their teaching Concepts.

Engineering Mathematics & General Aptitude Previous Questions & Solutions of GATE of all branches are available in a separate booklets.

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 & Communication Engineering (EC)

Network, Signals and Systems:

Circuit analysis: Node and mesh analysis, superposition, Thevenin's theorem, Norton's theorem, reciprocity.
Sinusoidal steady state analysis: phasors, complex power, maximum power transfer.
Time and frequency domain analysis of linear circuits: RL, RC and RLC circuits, solution of network equations using Laplace transform.

Linear 2-port network parameters, wye-delta transformation.

Continuous-time signals: Fourier series and Fourier transform, sampling theorem and applications.

Discrete-time signals: DTFT, DFT, z-transform, discrete-time processing of continuous-time signals. LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeroes, frequency response, group delay, phase delay.

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.

Analog Circuits:

Diode circuits: clipping, clamping and rectifiers.
BJT and MOSFET amplifiers: biasing, ac coupling, small signal analysis, frequency response.
Current mirrors and differential amplifiers.
Op-amp circuits: Amplifiers, summers, differentiators, integrators, active filters, Schmitt triggers and oscillators.

Digital Circuits:

Number representations: binary, integer and floating-point- numbers.
Combinatorial circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders.

Sequential circuits: latches and flip-flops, counters, shift-registers, finite state machines, propagation delay, setup and hold time, critical path delay.

Data converters: sample and hold circuits, ADCs and DACs.

Semiconductor memories: ROM, SRAM, DRAM.

Computer organization: Machine instructions and addressing modes, ALU, data-path and control unit, instruction pipelining.

Control Systems:

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

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, superheterodyne 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.

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.

Previous GATE Questions & Solutions (EC)

Weightage (2020 to 2026)

S.No	Name of the Subject	2020		2021		2022		2023		2024		2025		2026	
		1M	2M	1M	2M	1M	2M	1M	2M	1M	2M	1M	2M	1M	2M
1	Network Theory	3	2	2	4	2	3	4	1	3	2	2	2	3	2
2	Signals & Systems	2	3	2	3	3	2	4	4	2	4	3	2	3	5
3	Electronic Devices	2	5	2	2	4	3	3	2	2	5	1	4	3	3
4	Analog Circuits	3	4	3	3	2	4	2	4	3	3	5	4	2	4
5	Digital Circuits	2	3	3	3	3	4	4	2	3	4	3	3	3	5
6	Microprocessors	1	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Control Systems	2	3	2	2	2	3	1	3	2	3	2	4	1	3
8	Communications	3	3	4	6	2	5	1	5	5	3	4	4	2	5
9	Electromagnetics	3	4	2	4	2	2	1	5	3	3	-	3	5	1
10	Engineering Mathematics	5	3	4	3	5	4	5	4	2	3	5	4	3	2
11	General Aptitude	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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