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GATE - 2027



**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.

CONTENTS



Name of the Subject	Page No.
I. Network Theory	1 - 112
01. Network Elements	2 - 19
02. Network Theorems	20 - 36
03. Transient Response	37 - 58
04. Sinusoidal Steady State Response	59 - 86
05. Two Port Networks	87 - 105
06. Network Graphs	106 - 108
07. Miscellaneous	109 - 112
II. Control Systems	113 - 214
01. Basics of Control Systems	114 - 115
02. Signal Flow Graph and Block Diagram	116 - 123
03. Time Response Analysis	124 - 141
04. Stability	142 - 152
05. Root Locus Diagram	153 - 163
06. Frequency Response Analysis	164 - 187
07. Compensators & Controllers	188 - 196
08. State Space Analysis	197 - 214
III. Electronic Devices	215 - 296
01. Semiconductor Physics	216 - 238
02. PN-Junction Theory	239 - 260
03. BJT	261 - 272
04. MOSFET & MOS Capacitor	273 - 292
05. Optoelectronic Devices	293 - 296
IV. Analog Circuits	297 - 424
01. Diodes	298 - 313
02. Bipolar Junction Transistor	314 - 341
03. Frequency Response	342 - 346
04. FET BIASING & MOSFET	347 - 367
05. OP-Amplifier	368 - 408
06. Oscillators	409 - 412
07. Feedback Amplifier	413 - 418
08. Power Amplifier	419 - 421
09. 555 Timer	422 - 422
10. Miscellaneous	423 - 424

V. Digital Circuits	425 - 516
01. Number Systems & Code Conversions	426 - 428
02. Boolean Algebra	429 - 436
03. Logic Gates	437 - 445
04. Combinational Digital Circuits	446 - 460
05. Sequential Digital Circuits	461 - 487
06. Semiconductor Memories	488 - 493
07. Logic Families	494 - 504
08. A/D & D/A Converters	505 - 513
09. Instruction Set & Addressing Modes (Computer Organization)	514 - 516
VI. Microprocessors	517 - 536
01. Pin details of 8085 & Interfacing with 8085	518 - 525
02. Programming model, Instruction set of 8085 & Programming with 8085	526 - 536
VII. Signals & Systems	537 - 666
01. CT Signal - FS	538 - 547
02. CT Signal - FT	548 - 559
03. CT Signal - LT	560 - 569
04. DT Signal - DFS/DTFT	570 - 574
05. DT Signal - DFT/FFT	575 - 582
06. DT Signal - ZT	583 - 595
07. CT - LTI Systems	596 - 616
08. DT - LTI Systems	617 - 624
09. CT - Frequency Response	625 - 637
10. DT - Frequency Response	638 - 640
11. Sampling	641 - 655
12. Filter Design	656 - 656
13. Miscellaneous	657 - 666
VIII. Communications	667 - 766
01. Analog Communication Systems	668 - 690
02. Digital Communication Systems	691 - 708
03. Fundamentals of Information Theory	709 - 720
04. Random Signals and Noise	721 - 743
05. Noise In Digital Communication	744 - 766
IX. Electromagnetics	767 - 878
01. Maxwell's Equations	768 - 795
02. Plane Waves	796 - 821
03. Transmission Lines	822 - 846
04. Waveguides	847 - 858
05. Antennas	859 - 875
06. Miscellaneous	876 - 878