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UPSC Preliminary Examination

MORE THAN 34 YEARS OF SOLUTIONS 1992-2026

ELECTRICAL ENGINEERING

OBJECTIVE VOLUME - I

Previous Years Objective Questions with Solutions, Subjectwise & Chapterwise

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Foreword

Dear Students,

The Stage-I (Prelims) of ESE consists of two objective papers. Paper-I is of General Studies & Engineering Aptitude. Paper-II is of Electrical Engineering of 300 Marks and 3 hours duration. In stage-II (Mains), the technical syllabus is divided into two papers. The subjects included in this volume are:

1. Engineering Mathematics
2. Electrical Materials
3. Electric Circuits & Fields
4. Electrical & Electronic Measurements
5. Computer Fundamentals
6. Basic Electronics Engineering

Keeping in view of the above topics, the present Volume-I for prelims of new pattern is redesigned using the previous questions from 1992 onwards.

The style, quality and content of the Solutions for previous ESE Questions of Electrical Engineering, will encourage the reader, especially the student whether above average, average or below average to learn the concept and answer the question in the subject without any tension. However it is the reader who should confirm this and any comments and suggestions would be pleasantly received by the Academy.

It is observed that majority of ESE objective Questions are being asked as it is in many PSUs, state service commission, state electricity boards and even in GATE exam. Hence we strongly recommend all students who are competing for various competitive exams to use this book according to the syllabus of the exam concerned. This book can also be used by fresh Teachers in engineering colleges to improve their Concepts.

We proudly say that questions and solutions right from 1992 onwards are given in this book. The questions which appeared early 90's are most conceptual oriented and these are being repeated in the recent exams in a different way. Hence we advise the students to practice these questions compulsorily. The student is also advised to analyze why only a particular option is correct and why not others. Evaluate yourself, in which case, these other options are correct. With this approach you yourself can develop four questions out of one question.

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. 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.

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 Electrical Engineering (EE)

1. **Engineering Mathematics:** Matrix theory, Eigen values & Eigen vectors, system of linear equations, Numerical methods for solution of non-linear algebraic equations and differential equations, integral calculus, partial derivatives, maxima and minima, Line, Surface and Volume Integrals. Fourier series, linear, nonlinear and partial differential equations, initial and boundary value problems, complex variables, Taylor's and Laurent's series, residue theorem, probability and statistics fundamentals, Sampling theorem, random variables, Normal and Poisson distributions, correlation and regression analysis.

2. **Electrical Materials:** Electrical Engineering Materials, crystal structures and defects, ceramic materials, insulating materials, magnetic materials – basics, properties and applications; ferrities, ferro-magnetic materials and components; basics of solid state physics, conductors; Photo-conductivity; Basics of Nano materials and Superconductors.

3. **Electric Circuits and Fields:** Circuit elements, network graph, KCL, KVL, Node and Mesh analysis, ideal current and voltage sources, Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems, transient response of DC and AC networks, Sinusoidal steady state analysis, basic filter concepts, two-port networks, three phase circuits, Magnetically coupled circuits, Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions, Ampere's and Biot-Savart's laws; inductance, dielectrics, capacitance; Maxwell's equations.

4. **Electrical and Electronic Measurements:** Principles of measurement, accuracy, precision and standards; Bridges and potentiometers; moving coil, moving iron, dynamometer and induction type instruments, measurement of voltage, current, power, energy and power factor, instrument transformers, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meters, oscilloscopes, potentiometric recorders, error analysis, Basics of sensors, Transducers, basics of data acquisition systems.

5. **Computer Fundamentals:** Number systems, Boolean algebra, arithmetic functions, Basic Architecture, Central Processing Unit, I/O and Memory Organization; peripheral devices, data representation and programming, basics of Operating system and networking, virtual memory, file systems; Elements of programming languages, typical examples.

6. **Basic Electronics Engineering:** Basics of Semiconductor diodes and transistors and characteristics, Junction and field effect transistors (BJT, FET and MOSFETS), different types of transistor amplifiers, equivalent circuits and frequency response; oscillators and other circuits, feedback amplifiers.

Weightage of Subjects in Engineering Services Examination (2021 – 2026)

S.No.	Name of the Subject	2021	2022	2023	2024	2025	2026
01	Engineering Mathematics	15	12	12	13	12	13
02	Electrical Materials	13	14	13	9	12	13
03	Electric Circuits & Fields	16	11	10	13	13	12
04	Electrical & Electronic Measurements	13	12	13	12	11	14
05	Computer Fundamentals	9	13	12	12	12	11
06	Basic Electronics Engineering	11	15	15	14	12	13
07	Analog & Digital Electronics	12	10	10	13	13	13
08	Systems & Signal Processing	10	14	14	12	13	13
09	Control Systems	13	12	13	12	12	12
10	Electrical Machines	15	13	14	14	13	12
11	Power Systems	12	12	13	13	15	12
12	Power Electronics & Drives	11	12	11	13	12	12
Total No. of Questions		**150**	**150**	**150**	**150**	**150**	**150**

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