

ACE[®]

Engineering Publications
(A Sister concern of ACE Engineering Academy, Hyderabad)

ESE - 2027

UPSC Preliminary Examination

MORE THAN

34

YEARS OF
SOLUTIONS

1992-2026

ELECTRICAL ENGINEERING

OBJECTIVE VOLUME - I

Previous Years Objective Questions with Solutions,
Subjectwise & Chapterwise

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, digital, recording or otherwise, without the prior permission of the publishers.

Published at:



ACE Engineering Publications

#3rd Floor, Suryalok Complex, Rosary Convent School Road,
Gunfoundary, Basheer Bagh, Hyderabad – 500001,
Telangana, India.

Contact: 7799996602

Website: aceengineeringpublications.com

Email: aceenggpublications@aceenggacademy.com
help@ace.online

Authors:

Subject experts of ACE Engineering Academy, Hyderabad

While every effort has been made to avoid any mistake or omission, the publishers do not owe any responsibility for any damage or loss to any person on account of error or omission in this publication.

Mistakes if any may be brought to the notice of the publishers, for further corrections in forthcoming editions, to the following Email-id.

Email : aceenggpublications@aceenggacademy.com

1st Edition : 2011

16th Edition : 2026

Printed at:

Rowshni Graphics,
Hyderabad.

MRP : ₹.1050/-

ISBN : 978-1-64597-369-0

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.

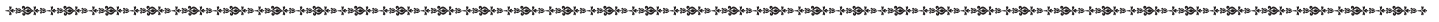
We proudly say that questions and solutions right from 1992 onwards are given in this book. The questions which appeared early 90's are most conceptual oriented and these are being repeated in the recent exams in a different way. Hence we advise the students to practice these questions compulsorily. 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; ferrites, 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.

— 1 —

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

CONTENTS

=====

Name of the Subject		Page No.
I	Engineering Mathematics	(01 - 40)
	01. Linear Algebra	02 - 06
	02. Numerical Methods	07 - 07
	03. Calculus	08 - 14
	04. Fourier Series	15 - 17
	05. Differential Equations	18 - 24
	06. Complex Variables	25 - 29
	07. Probability & Statistics	30 - 40
II	Electrical Materials	(41 - 164)
	01. Crystallography	42 - 51
	02. Conducting Materials	52 - 68
	03. Magnetic Materials.....	69 - 106
	04. Superconductors	107 - 117
	05. Ceramics & Dielectric Materials	118 - 142
	06. Semiconductors	143 - 160
	07. Lasers, Capacitors, Resistors & Nano Materials	161 - 164
III	Electric Circuits and Fields	(165 - 506)
	01. Network Elements	166 - 225
	02. Network Theorems	226 - 249
	03. Transient Response	250 - 287
	04. Sinusoidal Steady State Analysis	288 - 330
	05. Two-Port Networks	331 - 358
	06. Three Phase Circuits	359 - 364
	07. Network Synthesis	365 - 385
	08. Electromagnetic Fields	386 - 448
	09. Maxwell's Equations	449 - 475
	10. Electromagnetic Waves	476 - 488
	11. Transmission Lines	489 - 506

IV	Electrical and Electronic Measurements	(507 - 658)
	01. Units and Dimensions	508 - 510
	02. Error Analysis	511 - 523
	03. Electromechanical Instruments	524 - 549
	04. Measurement of Power & Energy	550 - 570
	05. Bridge measurement of R, L, C	571 - 592
	06. Potentio meters & Instrument Transformers	593- 599
	07. Cathode Ray Oscilloscope	600 - 608
	08. Digital Voltmeters	609 - 617
	09. Analog Electronic Voltmeters	618 - 626
	10. Q-meter	627 - 629
	11. DF Meters & Analyzers	630 - 631
	12. Transducers	632 - 658
V	Computer Fundamentals	(659 - 688)
	01. Number Systems & Boolean Algebra	660 - 662
	02. CPU Organization	663- 667
	03. IO Organization	668 - 669
	04. Memory Organization & Secondary Memory	670 - 673
	05. Basics of Operating Systems	674 - 678
	06. Memory Management (Virtual Memory)	679 - 681
	07. File Systems	682 - 682
	08. Programming (C Language)	683 - 685
	09. Basics of Networking	686 - 688
VI	Basic Electronics Engineering	(689 - 798)
	01. Basics of Diodes	690 - 713
	02. BJT Characteristics	714 - 730
	03. JFET Characteristics	731 - 741
	04. MOSFET Characteristics	742 - 750
	05. Biasing Circuits	751 - 758
	06. Amplifier Circuits	759 - 769
	07. Frequency Response	770 - 775
	08. Oscillators	776 - 782
	09. Feedback Amplifiers	783 - 790
	10. Power Amplifiers	791 - 794
	11. Waveform Generations.....	795 - 798