

# Architectural Engineering P.E. Practice Exam and Solutions





Edited by Nicole Susan Jenkins. P.E.



ARCHITECTURAL ENGINEERING INSTITUTE

## ARCHITECTURAL ENGINEERING PE PRACTICE EXAM AND SOLUTIONS

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### **Table of Contents**

News and Updates on www.aeinstitute.org	1
About NCEES	1
Updates on Exam Content and Procedures	1
Reference Material	1
Description of Examination	1
Exam-Day Schedule	2
Examinee Guide	2
Scoring and Reporting	2
Exam Specifications	3
Architectural Engineering AM Practice Exam	7
Architectural Engineering PM Practice Exam	35
Architectural Engineering AM Solutions	69
Architectural Engineering PM Solutions	81

#### News and Updates on www.aeinstitute.org

For news and updates about the Architectural Engineering Institute, including errata for this publication, visit AEI at **www.aeinstitute.org**.

#### About NCEES

The National Council of Examiners for Engineering and Surveying (NCEES) is a nonprofit organization made up of engineering and surveying licensing boards from all U.S. states and territories. Since its founding in 1920, NCEES has been committed to advancing licensure for engineers and surveyors in order to protect the health, safety, and welfare of the American public.

NCEES helps its member licensing boards carry out their duties to regulate the professions of engineering and surveying. It develops best-practice models for state licensure laws and regulations and promotes uniformity among the states. It develops and administers the exams used for engineering and surveying licensure throughout the country. It also provides services to help licensed engineers and surveyors practice their professions in other U.S. states and territories.

#### **Updates on Exam Content and Procedures**

Visit **ncees.org/exams** for updates on everything exam-related, including specifications, exam-day policies, and scoring. This is also where you will register for the exam and find additional steps you should follow in your state to be approved for the exam.

#### **Reference Material**

Design standards change annually. Please visit **ncees.org** for updated design standards applicable to your exam.

#### **Description of Examination**

The Principles and Practice of Engineering (PE) examination in architectural engineering is offered once each year. The NCEES website lists exam dates. You should contact your board for specific locations of exam sites.

Because there is no penalty for marking incorrect responses, candidates are advised to answer each question on the examination. Only one response should be marked for each question. No credit is given where two or more responses are marked.

The PE examination is open-book. Examinees must bring their own reference materials, including design standards. All reference materials must be bound and remain bound during the examination. Individual licensing boards determine the reference materials allowed, so you should contact your board or testing service for specific advice.

This book presents a complete sample examination. Correct responses require reasoning and calculation demonstrating competent engineering judgment. Because they illustrate the general content covered in the examination, these questions should be helpful in preparing for the examination. Solutions are presented for all questions in this book, although the solution presented

#### 1

may not be the only way to solve a particular question. The intent is to demonstrate the typical effort required to solve each question. No representation is made or intended as to future exam questions, content, or subject matter.

#### **Exam-day Schedule**

Be sure to arrive at the exam site on time. Late-arriving examinees will not be allowed into the exam room once the proctor has begun to read the exam script. The report time for the exam will be printed on your Exam Authorization. Normally, you will be given 1 hour between morning and afternoon sessions.

#### **Examinee Guide**

The *NCEES Examinee Guide* is the official guide to policies and procedures for all NCEES exams. All examinees are required to read this document before starting the exam registration process. It is available at **ncees.org/exams**. It is your responsibility to make sure that you have the current version.

#### Scoring and Reporting

NCEES typically releases exam results to its member licensing boards 8–10 weeks after the exam. Depending on your state, you will be notified of your exam result online through your MyNCEES account or via mail from your state licensing board. Detailed information on the scoring process can be found at **ncees.org/exams**.

#### NCEES Principles and Practice of Engineering ARCHITECTURAL ENGINEERING Exam Specifications

#### Effective Beginning with the April 2018 Examinations

• The exam is an 8-hour open-book exam. It contains 40 multiple-choice questions in the 4-hour morning session, and 40 multiple-choice questions in the 4-hour afternoon session. Examinee works all questions.

- The exam uses the US Customary System (USCS) of units.
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.

		Approximate Number of Questions
I.	Building Systems Integration	12
	A. Aspects of building performance that affect human comfort (e.g.,	
	B Building envelope analysis for integrity and efficiency	
	C. Impact of one system on another (e.g., lighting load on air-conditioning	
	system capacity)	
	<ul> <li>D. Life safety systems (e.g., generators, smoke control, exit lighting, fire alarms)</li> </ul>	
	E. Comparative systems efficiencies (including calculations for energy use and materials)	
	F. Sustainability in design and construction (e.g., energy efficiency,	
	indoor air quality, water conservation)	
	G. Applicable standards, codes, and regulations (e.g., NFPA, ASHRAE,	
	ICC, ADA)	
	H. Building plans, specifications, and models	
II.	Electrical Systems	22
	A. Electrical power systems, including load flow and distribution	
	B. Short circuit analysis	
	C. Grounding principles	
	D. Electrical construction methods and materials	
	E. Overcurrent protection methods and device coordination	
	F. Branch circuit and feeder conductor sizing	
	G. Power factor correction	
	I. One-line diagram	
	J. Fire alarm design principles	
	K. Lighting calculations (e.g., LPD, zonal cavity)	
	L. Lighting control	
	M. December 201	