CSET®

California Subject Examinations for Teachers®

TEST GUIDE

INDUSTRIAL AND TECHNOLOGY EDUCATION SUBTEST I

Subtest Description

This document contains the Industrial and Technology Education subject matter requirements arranged according to the domains covered by Subtest I of CSET: Industrial and Technology Education. In parentheses after each named domain is the domain code from the Industrial and Technology Education subject matter requirements.

Industrial and Technology Education
Subtest I: Nature of Technology

Part I: Content Domains for Subject Matter Understanding and Skill in Industrial and Technology Education

NATURE OF TECHNOLOGY (SMR Domain 1)

Candidates understand technology as a problem-solving process and know the history and evolution of technology. They understand that technology involves creativity and innovation and are able to use concepts from the core content areas of science, mathematics, social science, and language arts as well as other content areas commonly taught in California public schools to design solutions to problems. Candidates understand the social aspect of technology and analyze the positive and negative effects of technologies on society and the environment. They understand the skills, knowledge, attitudes, and commitment to lifelong learning necessary to develop technological literacy and apply this knowledge in a rapidly changing global environment.

0001   Innovation and Design (SMR 1.1)

    a. Demonstrate an understanding of the engineering design process (e.g., defining a problem, using research techniques, communicating solutions, analyzing and optimizing solutions).

    b. Understand the product life cycle (e.g., prototypes, transition to production, evaluating product success).

    c. Demonstrate an understanding of how to use technological processes and systems to arrive at solutions to real-world problems.

    d. Demonstrate an understanding of current technological methods and processes to meet the needs of new and emerging fields and technologies (e.g., robotics, artificial intelligence, biotechnology, nanotechnology).

    e. Demonstrate an understanding of factors that influence design form (e.g., color theory, layout, aesthetics, juxtaposition, dimension).

    f. Demonstrate an understanding of factors that influence design function (e.g., purpose, practicality, ergonomics, utility).

0002   Careers and Employability Skills (SMR 1.2)

    a. Demonstrate an understanding of industrial and technology career opportunities (including postsecondary opportunities) and career paths.

    b. Understand skills, knowledge, responsibilities, attitudes, and aptitudes associated with industrial and technology careers.

c. Demonstrate an understanding of workplace dynamics and structures (e.g., teaming, development of interpersonal and leadership skills, human resource and human efficiency development, Secretary's Commission on Achieving Necessary Skills [SCANS]).

0003 Safety and the Environment (SMR 1.3)

a. Demonstrate an understanding of health and safety procedures needed for laboratory and workplace settings.
b. Understand the safe and proper use and maintenance of tools and equipment.
c. Demonstrate an understanding of safety regulations (e.g., OSHA regulations) and procedures (e.g., use of MSDS, handling of hazardous waste), including emergency procedures.
d. Demonstrate an understanding of the safe design and management of laboratory facilities and planning of safe laboratory activities.
e. Demonstrate an understanding of environmental issues (e.g., water pollution, air pollution, noise pollution, health hazards) associated with the development and use of technology and technological systems (i.e., power and energy, communication and information, manufacturing, construction).
f. Understand procedures and techniques for selecting, maintaining, and repairing technological systems to ensure a safe environment.

0004 Society and Globalization (SMR 1.4)

a. Understand the history and evolution of technology.
b. Identify and analyze the positive and negative influences of technology on communities and society (e.g., air pollution, land use, environmental impact).
c. Analyze factors (e.g., cultural, economic) that influence innovation and the development of technology.
d. Demonstrate an understanding of the relationship between technological literacy and technical skills.
e. Demonstrate an understanding of legal and ethical issues related to technology (e.g., copyright, liability, intellectual property, patents).

0005 Independent and Integrated System Model (SMR 1.5)

a. Demonstrate an understanding of systems and subsystems in terms of input, process, output, and feedback.
b. Identify and analyze the resources needed to develop and support technological systems.
c. Demonstrate an understanding of control systems and their use in technological systems.
d. Demonstrate an understanding of project and product management.

0006   Integration with Other Academic Disciplines (SMR 1.6)

    a. Use appropriate mathematical concepts (e.g., algebra, trigonometry, statistics, geometry) to analyze data and solve problems.

    b. Use a variety of communication skills (e.g., technical writing, schematics, flowcharts, verbal communication) to convey information.

    c. Use appropriate scientific concepts (e.g., Newton's laws, ideal gas law, chemical reactions) to analyze and solve problems.

    d. Demonstrate an understanding of the interactions between technology and the humanities, culture, and political sciences.

Part II: Subject Matter Skills and Abilities
Applicable to the Content Domains in Industrial and Technology Education

Candidates demonstrate an understanding of the nature of technology and of the core technological concepts that remain constant as technological progress accelerates. Candidates understand the design process as a problem-solving model and are able to use it to solve problems in industrial and technology education. They apply core academic knowledge of industrial and technology education, including science, mathematics, measurement, economics, and data analysis to investigate and design technological systems and processes. Candidates are able to effectively communicate designed solutions using a variety of technologies and propose strategies for implementing the solutions. They understand how to use the tools, machines, resources, and processes needed to turn ideas into workable solutions. In addition, candidates understand and apply safety rules and practices in the classroom, laboratory, and workplace.

Candidates have knowledge of historical events, current research, and recent developments in technology and industry. Candidates have knowledge of interactions between technology and society (cultural, social, economic, and environmental) in which technologies are used. They demonstrate an understanding of the importance of continued education (e.g., professional organizations, technical publications, industry, research and development) for staying current with technological innovations. They are able to work with industry representatives and community organizations to identify industry trends and job opportunities, employers' expectations, and the personal characteristics (e.g., appropriate work habits, social and communication skills) necessary for obtaining and maintaining employment in industry and technology. They demonstrate an understanding of career planning and development and student leadership opportunities, along with the skills and attitudes needed for developing successful careers in industry and technology. Candidates are aware of the characteristics, functions, and structures of student leadership organizations, clubs, and competitive groups (e.g., SkillsUSA®, Technology Student Association [TSA]) and the candidates' roles and responsibilities as advisors.