CERTIFICATION EXAMINATIONS FOR OKLAHOMA EDUCATORS™ (CEOE™)

OKLAHOMA SUBJECT AREA TESTS™ (OSAT™)

FIELD 043: TECHNOLOGY ENGINEERING

TEST FRAMEWORK

September 2008

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I. Fundamentals of Technology
II. Arts/AV, Communications, and Information Technologies
III. Architecture and Construction
IV. Manufacturing
V. Transportation, Distribution, and Logistics

SUBAREA I—FUNDAMENTALS OF TECHNOLOGY

Competency 0001

Understand the historical and social context of technology.

The following topics are examples of content that may be covered under this competency.

- Recognize important events and developments in the history of technology.
- Understand the social and economic effects of technology.
- Understand the role of society, politics, and the economy in the regulation and development of technology.
- Understand positive and negative effects of technology on the environment.

Competency 0002

Understand connections between technology and other disciplines.

The following topics are examples of content that may be covered under this competency.

- Apply mathematical skills to solve technology-related problems (e.g., cost estimation, storage capacity requirements, circuit analysis, use of algebraic concepts and geometry in problem solving).
- Apply knowledge of physics to solve technology-related situations (e.g., moment of inertia, momentum, torque, gravitational force).
- Apply knowledge of chemistry and biology to solve technology-related situations (e.g., environmental protection, stack scrubbers, fuel cells, biotechnology).
- Apply knowledge of engineering to solve technology-related problems (e.g., design concepts, materials science concepts, mechanical concepts).

Competency 0003

Understand processes and procedures related to the design process.

The following topics are examples of content that may be covered under this competency.

- Identify steps in the design process and the roles of prototypes and models in technology.
- Analyze technology systems according to the universal systems model (i.e., goal, inputs, processes, outputs, and feedback).
- Analyze product features and production constraints (e.g., material specifications, function, cost, ergonomics) and their role in technology design.
- Apply procedures for troubleshooting and modifying technology systems.
- Identify and interpret symbols and lines used in drafting and computer-aided design (CAD).
- Interpret technical drawings and their notations (e.g., architectural drawings, isometric drawings, dimensioning, measurements and specifications, tolerances, multiview drawing, section drawing).
- Solve problems involving scale and proportion in technical drawings.

Competency 0004

Understand regulations, procedures, and skills related to ensuring safety in the technology workplace.

The following topics are examples of content that may be covered under this competency.

- Identify rules and guidelines related to the safe use of tools, materials, and processes related to technology.
- Demonstrate knowledge of appropriate procedures for dealing with accidents and injuries in the technology workplace.
- Apply skills needed to use tools and materials safely in the technology workplace.

Competency 0005

Understand the relationship between business and industry and the concepts and skills required in the modern technology workplace.

The following topics are examples of content that may be covered under this competency.

- Apply knowledge of basic economic concepts (e.g., supply and demand, opportunity cost, pricing, competition) in a given situation.
- Identify effective strategies and techniques for career development (e.g., career clusters), including the use of technology in job seeking and career enhancement.
- Recognize personal qualities and interpersonal skills that facilitate success in the workplace (e.g., ethics, reliability, punctuality, creativity, integrity).
- Recognize the role of student organizations in encouraging student participation and implementing activities that develop leadership traits.

SUBAREA II—ARTS/AV, COMMUNICATIONS, AND INFORMATION TECHNOLOGIES

Competency 0006

Understand the principles and characteristics of Arts/AV and communications technologies.

The following topics are examples of content that may be covered under this competency.

- Identify career opportunities related to Arts/AV and communications technologies.
- Identify Arts/AV and communications technologies and their role in global markets.
- Analyze communication systems and their components (e.g., source, encoder, transmitter, receiver, decoder, storage, retrieval, destination) and the relationships among the components.

Competency 0007

Understand the selection and use of tools, equipment, and materials in Arts/AV and communications technologies.

The following topics are examples of content that may be covered under this competency.

- Identify characteristics and principles of operation of tools, equipment, and materials (e.g., photographic and video equipment and materials, printing equipment and materials, wireless devices, radio equipment) used in Arts/AV and communications technologies.
- Apply skills in selecting appropriate tools, equipment, and materials used in Arts/AV and communications technologies.
- Identify characteristics of and procedures for selecting computer software and hardware.

Competency 0008

Understand information technology processes and procedures related to graphic communication.

The following topics are examples of content that may be covered under this competency.

- Demonstrate knowledge of elements of graphic design (e.g., color, line, proportion, symmetry).
- Identify types and characteristics of digital images (e.g., RGB and CMYK colors, resolution, scaling, color correcting).
- Demonstrate knowledge of processes and procedures related to image preparation and production (e.g., image capture, image editing, image transfer, image assembly, image carriers).
- Demonstrate knowledge of procedures for using computer hardware and software in graphic design (e.g., scanners, printers, photo-imaging software, drawing software).

SUBAREA III—ARCHITECTURE AND CONSTRUCTION

Competency 0009

Understand the principles and characteristics of architecture and construction.

The following topics are examples of content that may be covered under this competency.

- Identify career opportunities and career clusters related to architecture and construction.
- Identify architecture and construction technologies and their role in global markets.
- Demonstrate knowledge of legal and regulatory issues related to architecture and construction (e.g., environmental regulations, building codes, zoning regulations, waste disposal, Americans with Disabilities Act, OSHA and EPA regulations).

Competency 0010

Understand the selection and use of tools, equipment, and materials in architecture and construction.

The following topics are examples of content that may be covered under this competency.

- Identify characteristics and principles of operation of tools, equipment, and materials used in architecture and construction.
- Apply skills in selecting appropriate tools, equipment, and materials used in architecture and construction.
- Analyze architectural design factors, material selection, and constraints related to construction projects.

Competency 0011

Understand processes and procedures related to architecture and construction.

The following topics are examples of content that may be covered under this competency.

- Identify steps and procedures related to architectural construction project planning, design, and management.
- Identify processes and procedures (e.g., excavating, loading, hauling, compacting, framing, finishing) used in various types of construction projects (e.g., residential and commercial buildings, roadways, bridges, tunnels) and their characteristics.
- Identify appropriate construction processes and procedures in a given situation.
- Analyze the role of forces (e.g., compression, torsion, bending, shear effect) in architecture and construction.

SUBAREA IV—MANUFACTURING

Competency 0012

Understand the principles and characteristics of manufacturing technology.

The following topics are examples of content that may be covered under this competency.

- Identify career opportunities and career clusters related to manufacturing technology.
- Identify manufacturing technologies and the role of manufacturing technology in global markets.
- Demonstrate knowledge of legal and regulatory issues related to manufacturing technology (e.g., environmental regulations, patents, trademarks, copyrights, trade secrets, labeling, warranties, OSHA and EPA regulations, product recalls).

Competency 0013

Understand the selection and use of tools, equipment, and materials in manufacturing technology.

The following topics are examples of content that may be covered under this competency.

- Identify characteristics and principles of operation of tools, equipment, and materials used in manufacturing technology.
- Apply skills in selecting appropriate tools, equipment, and materials used in manufacturing technology.
- Analyze design factors, material selection, and constraints related to manufacturing projects.

Competency 0014

Understand processes and procedures related to manufacturing technology.

The following topics are examples of content that may be covered under this competency.

- Identify technical processes used in manufacturing (e.g., casting, forming, conditioning, separating, fastening, finishing, packaging) and their characteristics and uses.
- Identify appropriate manufacturing processes and procedures in a given situation.
- Identify procedures for ensuring quality control and meeting design criteria and constraints in a manufacturing system.

SUBAREA V—TRANSPORTATION, DISTRIBUTION, AND LOGISTICS

Competency 0015

Understand the principles and characteristics of transportation, distribution, and logistics.

The following topics are examples of content that may be covered under this competency.

- Identify career opportunities related to transportation, distribution, and logistics.
- Identify transportation, distribution, and logistics and their role in global markets.

Competency 0016

Understand the selection and use of tools, equipment, and materials in transportation, distribution, and logistics.

The following topics are examples of content that may be covered under this competency.

- Identify characteristics and principles of operation of tools, equipment, and materials used in transportation, distribution, and logistics.
- Apply skills in selecting appropriate tools, equipment, and materials used in transportation, distribution, and logistics.
- Identify types of power sources, fuels, and forms of energy and their characteristics.

Competency 0017

Understand processes and procedures related to transportation, distribution, and logistics.

The following topics are examples of content that may be covered under this competency.

- Demonstrate knowledge of processes, procedures, and operating principles related to power generation (e.g., wind, hydro, nuclear, solar, fossil fuel, fuel cells).
- Identify basic principles of electricity and electronics (e.g., flow of electrons, conductors, insulators, resistors, semiconductors).
- Solve problems involving voltage, resistance, current, and power in series and parallel circuits using Ohm's law.
- Identify appropriate transportation, distribution, and logistical processes and procedures in a given situation.