MICHIGAN TEST FOR TEACHER CERTIFICATION (MTTC)

TEST OBJECTIVES
FIELD 088: TECHNOLOGY AND DESIGN

Subarea	Approximate Percentage of Questions on Test
Concepts and Applications of Technology	39%
Physical Technology	23%
Information Technology	23%
Bio-Related Technology	15%

I. CONCEPTS AND APPLICATIONS OF TECHNOLOGY

001 Apply basic concepts of technology and technological systems and resources.

Includes identifying the structure and components of a technological system (i.e., input, process, output, feedback) and identifying types of technological resources (e.g., time, capital, people, information, tools and machines, energy, materials); classifying various technological systems; analyzing the operation of independent and integrated systems; evaluating processes for monitoring, adjusting, and controlling the behavior of a technological system; proposing and developing a technological system for solving a given problem; and assessing a technological solution to a given problem.

002 Apply principles of technological design and problem solving.

Includes identifying components of the design and problem-solving processes; applying the design process to propose solutions to technological problems; understanding the role of modeling; and employing problem-solving and critical-thinking skills to create and evaluate alternative solutions to a given technological problem.

003 Understand the effects of technology on individuals and societies.

Includes demonstrating a knowledge of the historical development of tools, equipment, processes, materials, systems, and products; analyzing the societal effects of a given technological development; recognizing technological developments that have led to social, civic, or economic problems; and analyzing the role of innovation and invention in technology.

004 Understand the relationships between technology, mathematics, science, and other fields of study.

Includes describing scientific and mathematical principles in a given technological system; and comparing and contrasting technological knowledge, principles, and methods across other fields of study.

005 Apply procedures and processes for servicing and maintaining technological systems.

Includes applying criteria for servicing a given technological system; selecting appropriate tools, materials, and equipment for maintaining and servicing a system; analyzing the economic advantages of maintaining a given system; demonstrating an understanding of quality control; analyzing methods for exchanging information with clients in both local and global economies; analyzing issues related to client satisfaction; and proposing mechanisms for using client feedback for product improvement.

006 Understand the interrelationships between technology and the environment.

Includes identifying environmental hazards associated with a given technological system; evaluating the environmental advantages and disadvantages of a technological application; analyzing the economic interrelationships between technology and the environment; analyzing how environmental factors contribute to the development of technology; and applying procedures for developing a technological solution to an environmental problem or need.

007 Apply health, safety, and environmental requirements to the learning environment.

Includes understanding federal, state, local, and school district regulations (e.g., OSHA, EPA, CPSC, DEQ); recognizing personal safety practices and responsibilities; understanding personal and professional liabilities; applying appropriate facilities and laboratory operation and maintenance practices; and understanding student and product safety regulations and issues.

II. PHYSICAL TECHNOLOGY

008 Apply resources, principles, and processes of manufacturing systems.

Includes identifying types of manufacturing systems (e.g., automated, custom, continuous, batch); analyzing the properties of materials; applying criteria for selecting tools, equipment, processes, materials, systems, and procedures for manufacturing a given product; understanding methods of monitoring and controlling manufacturing processes; and analyzing methods related to the operation and management of a manufacturing enterprise.

009 Apply resources, principles, and processes of construction systems.

Includes identifying procedures used in construction projects (e.g., planning and designing, site preparation, framing, finishing); understanding characteristics and properties of construction materials (e.g., composites, wood, glass, steel, masonry) and building systems (e.g., electrical, plumbing, HVAC); analyzing the structural characteristics of a given design; selecting an appropriate tool for a given task (i.e., cutting, forming, fastening, finishing); and analyzing various construction methods and systems.

010 Apply resources, principles, and processes of transportation systems.

Includes classifying and analyzing types of transportation systems (e.g., land, water, aerospace); analyzing energy use in transportation systems; analyzing control and propulsion systems; analyzing a given situation to determine appropriate applications or modifications of transportation systems; and recognizing the structure and function of transportation systems.

011 Apply resources, principles, and processes of energy and power systems.

Includes identifying units of energy and power (e.g., joule, watt, foot-pound, calorie); identifying and classifying types of energy resources; analyzing devices and systems for converting energy; analyzing methods for the transmission and control of power and energy; and analyzing energy use in various technological systems.

III. INFORMATION TECHNOLOGY

012 Apply principles of information processing.

Includes identifying components of communication systems (e.g., encoding, transmitting, receiving, storing, retrieving, decoding); applying knowledge of a variety of information-processing methods for inputting, retrieving, and evaluating information; describing the function of sensors and controls in communication systems; applying ethical and legal standards in information processing; and understanding the different uses of communication for communicating person-to-person, person-to-machine, machine-to-person, and machine-to-machine.

013 Apply principles of graphic communication.

Includes identifying elements of graphic design; interpreting production specifications from drawings and models; applying principles of mathematics (e.g., measurement, scale, proportion) and graphic design (e.g., balance, texture, color) to communicate technological solutions; evaluating the characteristics of design software (e.g., desktop publishing, CAD); and describing technical processes used in graphic communications.

014 Apply the principles of electronic communication.

Includes applying the fundamental principles of electricity and magnetism; comparing and contrasting digital and analog signals; analyzing the operating principles of a given system (e.g., telephony, radio, television, satellite); recognizing current and emerging technologies (e.g., fiber optics); and evaluating the civic, social, and environmental impacts of electronic communication systems.

015 Apply the basic principles of computers and computer networks.

Includes interpreting computer terminology (e.g., CPU, RAM, ROM); identifying and describing input, output, and secondary storage devices; applying criteria for selecting computer software for a given task; understanding computer networks (e.g., LAN, WAN, Internet); applying computer technology to solve problems; and evaluating the social, environmental, and economic impacts of emerging telecommunication systems (e.g., teleconferencing, telecommuting, electronic shopping).

IV. BIO-RELATED TECHNOLOGY

016 Understand issues related to health, safety, and ergonomics.

Includes recognizing potential health hazards in the home, community, and workplace; applying procedures for evaluating workplace safety; analyzing the role of state and federal health and safety regulations; applying methods for the safe operation of tools and machinery; and identifying principles of ergonomics and human dynamics in the design of systems, work methods, and work environments.

017 Understand applications of technology in agricultural and food production.

Includes recognizing agricultural resources (e.g., tools, machines, processes, materials, people, capital, energy, time, information); identifying technological applications in agriculture; analyzing technological processes used in food production and preservation; understanding the applications of technology in food-processing systems; analyzing the effects of technological development on agricultural systems; and analyzing the effects of agricultural technology on society.

018 Understand applications of technology in medical and health systems.

Includes recognizing medical and health resources (e.g., tools, machines, processes, materials, people, capital, energy, time, information); identifying technological applications in medical and health systems; analyzing technological processes used in the medical and health fields; understanding the applications of technology in the medical and health fields; analyzing the effects of technological development in medical and health systems; and analyzing the effects of medical and health technology on society.