Foundations of Technology Semester B Examination

Test Description
Length: 2 hours
Items: 50 SR (~85%), 2 BCR (~15%)

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<th>Topic</th>
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The vocabulary terms and objectives are grouped into units for your convenience. Some items may occur in multiple units during the semester. The vocabulary includes terms that students may encounter when reading examination items.

Some Vocabulary for the Exam:

**Apply Design Process**
- ability
- apply
- batches
- brainstorming
- charts
- communicate
- complex models
- concept generation
- conceptual model
- constraints
- creative thinking
- criterion
- decision-making
- design
- design problem
- design process
- deductive thinking
- development
- diagrams
- discarded
- disposability
- economic analysis
- engineering drawings
- experiment
- evaluation
- factors
- final results
- final solutions
- fiscal matters
- functional analysis
- generating ideas
- graphic communication
- graphic models
- human factors analysis
- information gathering
- investigate
- limitations
- market analysis
- marketing
- mathematical model
- mock-ups
- modeling
- models
- modifications
- modify
- observations
- optimization
- physical model
- plan
- preference
- problem solving
- product
- production
- proposed
- prototypes
- quality
- quality control
- quantitative
**Student Review Sheet**

- real world
- refine
- research
- resources
- simulation
- single quantity
- solid model
- solution
- specification analysis
- surface models
- system
- tolerances
- trade-off
- three dimensional
- two dimensional
- synthesize
- verbal communication
- virtual
- volume production
- wire frame model

**Use and Maintain Technological Systems**

- accident-free
- analyze
- architectural drawings
- assembly drawings
- CAD
- calculator
- computer
- computer-aided design
- conversion
- detailed drawings
- diagnose
- diagnostic tools
- digital meter
- directions
- documentation
- drawings
- energy
- engineering drawings
- flow charts
- forecasting
- function
- graphs
- graphics
- internet

- machines
- malfunction
- maintain
- maintenance
- materials
- one-view drawing
- oral techniques
- orthographic projection
- power
- procedures
- repair
- safe
- software
- spreadsheets
- symbols
- systems
- systems drawings
- technological
- technological system
- three-view drawing
- time charts
- tools
- troubleshoot
- two-view drawing
- word processing
- working environment
- World Wide Web
- written techniques

**Impacts of Products and Systems**

- altering
- assessment
- assessment techniques
- compare
- consequences
- contrast
- cultural impact
- dangerous
- data
- decision-making
- deductive thinking
- design forecasting
- economic impacts
- effects of technology
- environmental impacts
- evaluate
- evaluation techniques
- forecasting
- forecasting techniques
- humanities information
- impacts
- information
- investigation
- iterative steps
- knowledge
- natural systems
- political impacts
- quality
- relevancy
- risk management
- scientific information
- societal impacts
- synthesize data
- synthesis techniques
- synthesizing
- technological development
- technological information
- technological systems
- testing
- trend analysis
- trends

**Medical Technologies**

- absorption anti-pathogenic
- biochemistry
- capabilities
- chemotherapy clinical
- pharmacology
- diagnosing
- disabled
- diseases
- disease predisposition
- disease state
- distribution
- DNA
- drug composition
- drug rehabilitation
- enviropig
- ethics
- excretion
- forensic medicine
- genetic engineering
- genetic information
- genetic material
Student Review Sheet

- genetically modified crops
- GMC
- incidence of testing
- informatics
- interactions
- mandates
- medical applications
- medical care
- medical technologies
- metabolism
- molecular biology
- neurology
- organic material
- patient condition
- parameter
- paraplegic
- penicillin
- pharmaceuticals
- pharmacology
- physical medicine
- physical rehabilitation
- physical therapy
- polio vaccine
- PRDV
- prevention
- primary prevention
- Primary Remote Diagnostic Visits
- psychopharmacology
- rehabilitation
- recombinant DNA
- remission
- screening
- secondary prevention
- super rice
- surgical procedures
- telemedicine
- tertiary prevention
- test results
- therapy
- toxicology
- transgenic engineering
- treatment
- vaccines
- video conferencing

**Agriculture and Biotechnologies**
- adverse effects
- agribusiness
- agriculture
- agricultural practices
- agriscience
- altering
- artificial
- bacteria
- beverages
- bioreactors
- bio-products
- biotechnology
- catalyst
- conservation
- crops
- crop production
- distribution
- drought
- ecosystem
- environment
- environmental resources
- erosion
- fauna fermentation
- fertilizers
- fiber
- flora
- food
- genetically modified
- generic engineering
- gene splicing
- grains
- growth processes
- hydroponics
- hydroponics station
- infestations
- land management
- livestock
- marketing
- microbial applications
- natural disasters
- organisms
- pests
- pesticides
- pH
- physical technologies
- plants
- precipitation
- produce
- purification techniques
- recombinant
- regulations
- run-off
- sediment
- seeds
- separation techniques
- soil
- water quality

**Energy and Power Technologies**
- air conditioning
- alternate
- biofuels
- biogas
- biomass
- biomass resources
- chemical
- chemical energy
- closed system
- coal
- combustion
- condition
- conservation of energy
- conversion
- cooling system
- create
- degradation
- destroyed
- efficiency
- electrical
- electrical energy
- energy
- entropy
- fission
- force
- fossil fuels
- fuel
- fusion
- generator
- generation plant
- heating system
- isolated system
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<tr>
<th>Kinetic Energy</th>
<th>Communication Systems</th>
<th>Relevance</th>
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**Transportation Technologies**

- Air lanes
- Air Transportation
- Aerospace
- Aviation
- Control Systems
- Escalator
- Elevator
- Energy
- Environments
- Environmental Factors
- Fixed Route
- Goods
- Guidance Systems
- Heavy-than-air
- Inland
- Inland Waterways
- Intelligent Systems
- Intelligent Transportation
- Interconnected
- Intermodal
- Intermodalism
- Interstate
- Lighter-than-air
- Manned
- Marine Transportation
- Materials
- Modes
- Non-Intelligent Systems
- Oceans
- Pedestrian
- People
pipeline
political influence
power
propulsion system
ransom route
roadways
seas
sea-lanes
service
shipping lanes
space transportation
structural systems
subsystems
support systems
suspension system
systems
technical systems
terrestrial transportation
transcontinental
transoceanic
transportation
unmanned

Manufacturing Technologies
acoustical properties
advertising
altering
assembly
assembly line
automation
batch manufacturing
chemical technologies
Computer Integrated Manufacturing CIM
consumables
continuous manufacturing
continuous production
 corporations
custom-made
custom manufacturing
diagnosing
direct sales
distribution
durable
efficiency
fabric
firms
flexible manufacturing
franchised business
goods
installing
interchangeable
interchangeable parts
intermittent manufacturing
international
international standards
magnetic properties
maintenance
manufacturing
marketing
marketing process
market research
mass production
material properties
material science
mechanical properties
mixed materials
natural
non-durable
obsolesce
optical properties
physical properties
primary process
production
processing plant
quality control
recalling
repairing
retrofitting
robots
robotics
sales
secondary processing
servicing
standards
synthetic
textiles
thermal properties
troubleshooting
upgrading

Construction Technologies
alteration
architecture
architect
blue prints
buildings
CAD
codes
communication system
computer aided design
construction
cooling system
design
design constraints
engineers
green construction
heating system
heavy construction
HVAC
fasteners
framework
framing
foundations
infrastructure
inspections
installations
intelligent buildings
intended use
LEED
maintenance
materials
modular
overruns
permits
prefabricated
production
regulations
renovation
requirements
residential
shelter
structures
systems
Student Review Sheet

Upon successful completion of Semester B the student should be able to:

**Design Process**

- read and interpret technical information.
- recognize safe laboratory procedures.
- identify meaningful, answerable, technological questions.
- identify appropriate methods for conducting a design solution.
- identify the hypothesis of an experiment.
- identify the control in an experiment.
- distinguish between an engineering and technological design problem.
- identify the appropriate instruments and materials needed to conduct an experiment.
- research, investigate, and generate ideas for the design.
- defend brainstorming as an excellent technique for generating ideas and encouraging creative thinking.
- synthesize research and development and specify the goals of a design.
- identify criteria and constraints and determine how these will affect the design process.
- use deductive thinking processes to limit the possible solutions to a few good ones.
- consider concept generation, development, production, marketing, fiscal matters, use, and disposability of a product or system.
- test, experiment with, select, and use a variety of resources to optimize the development of the design.
- illustrate a two-dimensional and three dimensional drawing.
- use computer-aided design software.
- make a model and prototype.
- defend the need for verifiable data.
- organize data using appropriate techniques.
- identify technological trend trends revealed by data.
- analyze data to form conclusions.
- apply the technological design process
- use analyzed data to confirm, modify or reject a design solution.
- defend when sufficient resources are not available how existing resources could be modified or new ones could be identified.
- identify and consider trade-offs among the proposed solutions.
- plan and select the best possible solution that takes into account the constraints and criteria obtained from research and personal preference.
- synthesize various factors, including the constraints, criteria, and information gathered by research.
- refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
- evaluate proposed or existing designs in the real world.
- modify a design solution so that it more effectively solves a given problem by taking into account the design constraints in order to consider the next step.
- evaluate a design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note
areas where improvements are needed.
- explain why design solutions are measured against criteria and constraints and why this is central to the evaluation process.
- assess previously ignored solutions, perhaps with modifications, as possible choices.
- explain when previously favored design solutions are discarded, they may still be appropriate for consideration later in the design process.
- develop and produce a product or system using a design process.
- describe the process where items can be produced in single quantity, while others can be made in batches or volume production.
- explain the role of quality control and tools they use.
- evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.
- defend that the final results should be compared to the original goals, criteria, and constraints.

**Use and Maintain Technological Systems**
- demonstrate basic knowledge in how to use and maintain technological systems.
- document processes and procedures and communicate them to different audience
- use appropriate oral and written techniques.
- describe communication techniques that include flow charts, drawings, graphics, symbols, spreadsheets, graphs, time charts, and World Wide Web pages.
- diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
- demonstrate proper use of diagnostic tools in the maintenance of a system.
- troubleshoot, analyze, and maintain given technological systems to ensure safe and proper function and precision.
- monitoring the operation, adjusting the parts, cleaning, and oiling of a given system.
- explain examples of how a given product or system can be properly maintained.
- operate pre-determined systems so that they function in the way they were designed.
- describe safety procedures and how following directions is key to ensuring an accident-free working environment.
- use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.

**Impacts of Products and Systems**
- assess the impact of products and systems.
- collect information and evaluate its quality.
- use methods comparing and contrasting sources, examining relevancy, and investigating the background of experts to determine accuracy of information.
- synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.
- exercise deductive thinking and synthesis techniques.
- explain how historical events, global trends, and economic factors are used to evaluate
and consider how to manage the risks incurred by technological development.

- use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.
- use assessment techniques to evaluate involving iterative steps and procedures that requires analyzing trade-offs, estimating risks, and choosing a best course of action.
- defend the assessment of a product or system which can prove that it is dangerous, but it cannot prove that it is safe.
- demonstrate forecasting techniques to evaluate the results of altering natural systems.

**Medical Technologies**

- understand and be able to properly select and use medical technologies.
- explain medical technologies to include prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained.
- defend the development of vaccines and drugs has helped to eradicate or cause remission of many serious illnesses.
- explain how the development of diagnostic tools, such as the x-ray machine, computerized tomography (CT) scan, and lasers, allows for less invasive interior views of the body than surgery.
- explain how the use of specially designed equipment can help provide rehabilitation to disabled persons.
- describe where the use of a wheelchair and other specially designed equipment, a paraplegic person can play basketball; dialysis maintains health for those with no kidneys; and laser eye shaping helps eliminate the need for glasses or contact lenses.
- explain how many technologies designed for health, medicine, and safety are specialized and can be expensive to maintain.
- illustrate that telemedicine reflects the convergence of technological advances in a number of fields, including medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology.
- describe telemedicine is designed for emergency situations, rural health care, forensic medicine, and monitoring chronic conditions.
- explain how telemedicine represents a significant change in the delivery of medical care by increasing the number of doctors who can diagnose illness and offer treatment in unsafe and remote area via computer or videoconference.
- explain how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.
- express how recombinant DNA technology, in the form of applied molecular research, has resulted in methods for screening and diagnosis of disease states and disease predisposition (molecular diagnostics).
- defend the potential for misuse of recombinant DNA information.
Agriculture and Biotechnologies

- understand and be able to properly select and use agricultural and biotechnologies.
- explain that agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.
- identify who regulates the marketing and safety of agriculture products and systems.
- describe biotechnology and its applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering.
- describe how biological processes used in combination with physical technologies to alter or modify materials, products, and organisms.
- identify key examples of biotechnology applications like fermentation, bio-products, microbial applications, separation and purification techniques, and monitoring growth processes.
- defend the selection of genetically modified seeds, application of modified organisms, and uses of algal fertilizers generated from photo bioreactors are good examples of extending agricultural practices through biotechnology applications.
- define conservation as the process of controlling soil erosion, reducing sediment in waterways, conserving water, and improving water quality.
- check graphs to determine that they do not misrepresent results.
- illustrate how landscape design techniques are used in gardens or on farmland to prevent erosion and control heavy rains.
- defend the engineering design and management of agricultural systems which require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.
- compare two management techniques of agriculture such as the amount, orientation, and distribution of crops and other plants; the effects of pests, and the management of land and animals to reduce adverse effects on plant growth, crop production, and environmental resources.

Energy and Power Technologies

- understand and be able to properly select and use energy and power technologies.
- learn that energy cannot be created nor destroyed; however, it can be converted from one form to another.
- describe scientific concepts and laws concerning energy.
- classify energy as either kinetic or potential.
- explain why energy cannot be transported easily.
- explain energy efficiency.
- explain the Second Law of Thermodynamics.
- identify energy resources as renewable or nonrenewable.
- identify alternate and sustainable energy resources.
- check graphs to determine that they do not misrepresent results.
- differentiate why power systems should be designed to conserve energy and to provide maximum efficiency with minimal environmental degradation.
Student Review Sheet

Information and Communications Technologies

- understand and be able to properly select information and communication technologies.
- use information and communication technologies.
- explain that information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information.
- describe information and communication systems that allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
- apply information and communication systems to inform, persuade, entertain, control, manage, and educate.
- give details of systems that include the Internet, telephones, televisions, radios, computers, and fax machines.
- put in plain words how information and communication systems are widely used in commercial endeavors to assist in decision-making and problem solving.
- check graphs to determine that they do not misrepresent results.
- make clear how entertainment has been enhanced through technology by providing pleasure and enjoyment for people in their free time.
- rationalize the overall usefulness of information as dependent upon such factors as its relevance, timeliness, truth, completeness, and cultural value.
- justify the factors that help shape the meaning of the information, which has become a valued commodity in today’s society.
- detail communication systems which are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
- compare and contrast the many ways to communicate information, such as graphic and electronic means.
- identify examples of graphic systems.
- use symbols, measurement, conventions, icon, graphic images, and languages to incorporate a variety of visual, auditory, and tactile stimuli.
- expound on the development of the computer which has spurred new terminology.

Transportation Technologies

- understand and properly select transportation technologies.
- use transportation technologies.
- make clear that the transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.
- describe transportation systems to include subsystems of aviation, rail transportation, water transportation, pedestrian walkways, and roadways.
- detail transportation subsystems that use a wide array of devices, vehicles, and systems in order to move people, materials, and goods.
- define transportation.
- check graphs to determine that they do not misrepresent results.
- explain intermodalism.
- explain the impacts of transportation services and methods on the global population.
- compare and contrast intelligent and non-intelligent transportation systems.
Student Review Sheet

- detail the development of intelligent transportation systems.
- describe non-intelligent transportation systems.
- illustrate innovative designs that capitalize on natural designs that capitalize on natural settings and provide convenience.

**Manufacturing Technologies**

- understand and be able to select and use manufacturing technologies.
- defend servicing to keep products in good operating condition.
- define servicing processes include installing, diagnosing and troubleshooting, recalling, maintaining, repairing, altering and upgrading, and retrofitting.
- explain why some products are designed for eventual obsolescence.
- account for product obsolescence.
- give reasons why materials have different qualities.
- classify materials as natural, synthetic, or mixed.
- group durable goods and non-durable goods.
- classify manufacturing systems such as customized production, batch production, and continuous production.
- check graphs to determine that they do not misrepresent results.
- describe customized production.
- define batch production.
- explain continuous production.
- expound on the interchangeability of parts to increase the effectiveness of manufacturing processes.
- describe chemical technology.
- make clear the role of marketing.

**Construction Technologies**

- define construction technologies.
- classify construction technologies.
- understand and properly select construction technologies.
- use construction technologies.
- check graphs to determine that they do not misrepresent results.
- explain infrastructure.
- explain how structures are constructed using a variety of processes and procedures.
- evaluate the appropriateness of construction procedures.
- clarify requirements in the design of structures.
- identify common construction design constraints.
- explain the importance of constraints to include appearance, strength, longevity, maintenance, and available utilities.
- expound on the regulation of design and construction of structures by laws, codes, and professional standards.
- detail why structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.
- explain why contractors use prefabricated materials.
Student Review Sheet

BCRs were put on the exam review sheets to encourage appropriate student collaboration and review of concepts in preparation for the entire exam (not just the BCRs). Teachers should not address these BCRs during the course of their instruction nor should they assist in preparing students for the BCRs during exam review. Students are able to collaborate and use other resources to review and solidify concepts. Students should be prepared to answer any of the following BCRs. Teachers will select TWO from the list below on the day of the exam:

**BCR 1: Troubleshooting Problems with a System**
John is at the kitchen sink washing dishes. While wiping the counter, he accidentally knocked the plugged in electric coffee maker into the sink which is filled with water. Use what you know about electricity and electrical systems to prepare a written statement that describes how John should safely correct this problem.

In your response, be sure to

- identify the dangers of electric shock to human life
- describe how the path of electricity moves through the body possibly causing death
- explain in detail a safe way to rescue the coffee maker without causing personal injury

**BCR 2: Transportation Technologies**
Many people view transportation as one the basic needs humans have. The more complex life and work become, it seems the more indispensable the elements of transportation systems are.

From what you learned in your technology education class, explain transportation, describe what is meant by a intermodal transportation, and give an example of an intermodal transportation system.

In your response, be sure to

- explain what transportation is
- describe intermodal transportation
- provide an example of an intermodal transportation system

The following information will be provided in the test book for students to use during their exam:
- Technology Education Rubric