Student Review Sheet

Foundations of Technology Semester B Examination

Test Description

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

Topic	Approximate Number of Selected Response Items
Apply Design Process	6
Use and Maintain Technological Systems	5
Impacts of Products and Systems	4
Medical Technologies	3
Agriculture and Biotechnologies	4
Energy and Power Technologies	6
Information and Communication Technologies	6
Transportation Technologies	4
Manufacturing Technologies	7
Construction Technologies	5
Totals	**50**

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
production
quality
quality control
quantitative

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

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

kinetic energy
Law of Conservation of Energy
Law of Conservation of Matter
Law of Thermodynamics
loads
mechanical
mechanical energy
methane
natural gas
nonrenewable
nuclear
nuclear energy
open system
peat
perpetual motion
petroleum
pollution
potential energy
power
power systems
process
radiant
radiant energy
renewable
resistance
solar
solar panel
sources
sustainable
thermal
thermal dynamics
thermal energy
transfer
transmitting
transporting
uranium

Information and Communications Technologies

accuracy
analog
binary
binary code
capacity
chip
communication
communication systems
communication technology
completeness
complex systems
computer
cultural value
data
data processing
design
development
digital
electronic communications
emerging technologies
entertainment
facsimile
feedback
gigabyte
graphic communications
hard drive
icon
information
information processing
information systems
input
interactive
interference
international
interruption
internet
keyboard
machine to machine
machine to person
measurement
memory
message
multi-media
output
person to machine
person to person
photochemical
photochemistry
printing
process
production
radio
receiver
receiving
relevance
sender
sending
signal
stimuli
storage devices
symbols
systems
telegraph
telephone
television
transmitter
truth
visual messages

Transportation Technologies

air lanes
air transportation
aerospace
aviation
control systems
escalator
elevator
energy
environments
environmental factors
fixed route
goods
guidance systems
heavier 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.
- defend the Law of Conservation of Energy.
- 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.

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 clears 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 devises, 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.

- 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