Abiotic Disorders – Science

Draws 7 Questions

A. Evaluate soil and site influences on plant performance
    1. Water deficit
    2. Aeration deficit
    3. Salinity
    4. Specific ion toxicity
    5. pH-related problems
    6. Mineral deficiencies/toxicities
B. Evaluate physical and mechanical injury
    1. Vehicles
    2. Equipment
    3. Vandalism
    4. Tree protection systems
    5. Excavation and trenching
C. Evaluate chemical and pollution injury
    1. Pesticides
    2. Plant growth regulators
    3. Other substances
    4. Air pollution
D. Evaluate meteorological influences on plant growth
    1. Wind
    2. Solar intensity and duration
    3. Temperature
    4. Precipitation
    5. Humidity
    6. Lightning

Biology – Science

Draws 9 Questions

A. Explain plant anatomy
    1. Leaf, flower, fruit
    2. Twig, branch, trunk
    3. Wood, bark
    4. Root, mycorrhizae
B. Explain physiology
    1. Photosynthesis, respiration
    2. Transpiration
    3. Water, nutrient absorption
    4. Nutrition
C. Explain how trees grow and develop
    1. Meristems
    2. Hormones
    3. Resource allocation
    4. Root-Shoot ratio
    5. Live wood-Dead wood ratio
    6. Live crown ratio
D. Apply knowledge of tree structure and mechanics
    1. Growth patterns
    2. Branch attachment
    3. Codominant stems
    4. Reaction wood
    5. Trunk flare, root plate
    6. Root structure
E. Explain disease management strategies
    1. Compartmentalization Of Decay in Trees
    2. Health, vitality, vigor
    3. Carbohydrate reserves
    4. Protective compounds and structures
F. Use knowledge of the interrelationships among plant species when selecting plants for a diverse landscape
    1. Ecological succession
    2. Invasive plants
    3. Plant or soil biology relations
    4. Allelopathy

Biotic Disorders – Science

Draws 8 Questions

A. Differentiate between different types of biotic life cycles and how they relate to plant injury and management
    1. Disease and pest triangle
    2. Disease, pest infection, infestation cycle
B. Identify characteristics of pest arthropod, wildlife, and pathogens and the injury they cause
    1. Arthropods
    2. Pathogens
    3. Wildlife and animal injury
C. Evaluate tree response to different types of biotic injury
    1. Site of injury
    2. Tree and pest interactions
D. Detect the presence or absence of biological control agents
    1. Predators
    2. Parasites
    3. Parasitoids
    4. Pathogens

Plant Identification and Selection – Science

Draws 7 Questions

A. Summarize the characteristics and attributes of tree species
    1. Flowers
    2. Fruits
    3. Buds and stems
    4. Leaves
    5. Color
    6. Growth habits
B. Summarize species tolerances and ranges
C. Classify plants botanically
    1. Angiosperms
    2. Gymnosperms
    3. Nomenclature

Soil Science – Science

Draws 9 Questions

A. Judge how existing soil properties on a site will impact tree growth and development
    1. Physical
    2. Chemical
    3. Biological
B. Generalize how soil and water conditions or properties affect tree root development
    1. Oxygen levels
    2. Water and compaction curves
    3. Texture and bulk density relationships
C. Interpret results from a standard soil test
D. Summarize how soil properties and soil water interact
    1. Gravitational water
    2. Available water
    3. Capillary water
    4. Wilting point
    5. Perched water table
E. Distinguish between soil physical, chemical, and biological properties of forests and managed turf systems
    1. Fungal and/or bacterial ratio
    2. Importance of different biological groups in each system

Climbing, Rigging, and Removal – Practice

Draws 6 Questions

A. Apply climbing techniques and safety
    1. Apply ANSI Z133.1 safety standard
    2. Risk assessment
    3. Employ safe ascension and movements
    4. Attachments
    5. Evaluate the proper use of equipment
    6. Ropes and knots
B. Apply principles and techniques of rigging, felling, and removal
    1. Planning methods
    2. Evaluate the proper use of equipment
    3. Judge forces, dynamics, friction, weight, and loading
    4. Types of cuts
    5. Ropes and knots
    6. Apply ANSI Z133.1 safety standard

Diagnostic Process – Practice

Draws 9 Questions

A. Diagnose plant problems in a step-by-step fashion
    1. Plant identification
    2. Site characteristics and history
    3. Parts of tree affected
    4. Symptoms and signs
    5. Normal versus abnormal tree characteristics
    6. Review of common problems
B. Use diagnostic instruments and tools
C. Collect and analyze data
    1. Field analysis
    2. Lab procedures
    3. Interpretation of results
    4. Generate diagnostic reports

Installation Practices – Practice

Draws 9 Questions

A. Evaluate site and species selection
    1. Soil
    2. Above Ground
    3. Species
B. Summarize proper transplanting principles and techniques
    1. Apply tree planting best management practices, ANSI A300 part 6, and/or applicable standards
    2. Nursery production techniques
    3. Handling and storage
    4. Planting holes
C. Care for newly planted trees
    1. Irrigation
    2. Staking, guying, and bracing
    3. Wrapping
    4. Antidessicants
    5. Mulching
    6. Root regeneration
    7. Weeds and other competing vegetation

Plant Health Care – Practice

Draws 8 Questions

A. Explain the definition and philosophy of plant health care
    1. Contrast plant health care and integrated pest management
B. Conduct monitoring, inspection, and documentation of landscape problems
    1. Monitoring process
    2. Inspection of key plants and pests
    3. Documentation and reports
    4. Client relations
C. Evaluate stress as a contributing factor to disease
    1. Natural defenses of trees
    2. Environmental stress
    3. Plant and pest interactions
D. Evaluate cultural, biological, mechanical, and chemical treatment options
    1. Cultural
    2. Biological
    3. Mechanical
    4. Chemical
E. Explain regulatory practices
    1. Quarantine
    2. Eradication
    3. Suppression

Pruning – Practice

Draws 9 Questions

A. Assess principles and apply theories of pruning trees
    1. Reduce risk of failure
    2. Branch structure
    3. Clearance
    4. Reduce shade
    5. Tree health
    6. Flower or fruit production
    7. Aesthetics
B. Assess pruning techniques
    1. Structure
    2. Cleaning
    3. Thinning
    4. Raising
    5. Reduction
    6. Utility
    7. Vista
    8. Espalier, topiary
    9. Hedging
    10. Restoration
    11. Pollarding
    12. Topping
    13. Fruit trees
C. Apply pruning best management practices
    1. Location of pruning cut
    2. How much to prune
    3. Influence of time of year
    4. Physiological effects of pruning
    5. Problems associated with improper pruning
D. Generate pruning specifications based on best management practices
    1. Species
    2. Age class
    3. Plant vigor
    4. Branch size
    5. Live crown ratio
    6. Percent reduction

Soil Treatment – Practice

Draws 7 Questions

A. Apply fertilizing best management practices
    1. Elements
    2. Fertilizers
B. Select fertilization and soil modification techniques
    1. Fertilization application
    2. Vertical mulching
    3. Radial trenching
    4. Tillage
    5. Soil replacement
C. Develop a treatment plan based on soil and plant analyses
    1. pH considerations
    2. Rate calculations
D. Generate management plans for problem soils
    1. Salt remediation
    2. Mulching
    3. Compost
    4. Inoculants
    5. Replacement
E. Employ principles of prescription fertilization
    1. Fertilizer timing
    2. Rate
    3. Application techniques
F. Describe the effects of fertilization on trees

Support and Protection – Practice

Draws 3 Questions

A. Apply support systems best management practices
    1. Cabling and bracing
    2. Guying
    3. Propping
    4. Implement follow-up inspections
B. Apply lightning protection best management practices
    1. Lightning protection systems
    2. Implement follow-up inspections

Water Relations and Irrigation – Practice

Draws 6 Questions

A. Explain the role of water in tree health
    1. Photosynthesis
    2. Transpiration
    3. Transport
    4. Turgor pressure
    5. Osmotic adjustment
    6. Hydration, desiccation, and super cooling
    7. Plant age, condition, species, and impact of water or irrigation
B. Summarize the effects of water stress
    1. Flood
    2. Drought
    3. Turf and tree issues with water management
    4. Field capacity
    5. Wilting point
    6. Saturation
    7. Reclaimed water
    8. Water quality
C. Summarize water absorption and movement
    1. Hydraulic lifting
    2. Water transport
    3. Measurement
    4. Irrigation management

Business Relations – Management

Draws 8 Questions

A. Judge professional ethics in arboriculture
    1. Clients and employees
    2. Competition
    3. Bidding
    4. Conflict of interest
    5. Marketing
    6. Job completion and performance
    7. Unnecessary work
    8. Due care
B. Employ industry standards and practices
    1. ISA Code of Ethics
    2. A300
    3. Occupational safety and health administration (OSHA) or CanOSH
    4. Z133.1
    5. Z60.1
C. Understand and interpret legal requirements
    1. Trespass
    2. Resource protection
    3. Arboriculture case law
    4. Regulatory
D. Conduct business operations
    1. Client relations
    2. Employee relations
    3. Insurance

Inventory and Management Plans – Management

Draws 6 Questions

A. Develop inventories
    1. Develop goals and objectives for tree or landscape inventories
    2. Describe types of inventories
    3. Understand inventory methodology
    4. Explain the types of data to be collected
    5. Analyze and evaluate inventory information
B. Develop management plans
    1. Set goals and objectives for management plans
    2. Describe, understand, and evaluate components of management plans
C. Implement management plans
    1. Generate budgets
    2. Develop planned maintenance activities
    3. Understand unscheduled maintenance
    4. Understand mechanisms for recording work
    5. Monitoring and reporting
    6. Reassess management plans

Plant Appraisal – Management

Draws 6 Questions

A. Use the appropriate appraisal technique
    1. Cost approach
    2. Income approach
    3. Market approach
B. Generate plant appraisal reports
    1. Written reports
    2. Other considerations

Risk Assessment – Management

Draws 12 Questions

A. Examine liability and negligence
    1. Duty of care
    2. Standard of care
    3. Breach of duty
B. Use assessment tools
    1. Basic assessment tools
    2. Assessment of internal decay
    3. Root assessment
    4. Change of lean
    5. Load tests
    6. Advanced assessments
C. Evaluate potential targets
    1. Types of targets
    2. Occupancy rates
    3. Likelihood of failure
    4. Consequences of failure
    5. Stratifying and prioritizing targets
D. Assess the site
    1. Site considerations
    2. History of failures
    3. Weather
    4. Tree exposure
    5. Topography
    6. Soil influence
    7. Site disturbance
E. Examine wood structure, tree decay, and mechanics
    1. Wood structure
    2. Growth strategies
    3. Response growth
    4. Health and vigor
    5. Types of decay fungi
    6. Progression of decay
    7. Compartmentalization of decay in trees (CODIT)
    8. Location in the tree
    9. Indicators of decay
    10. Mechanics principles
    11. Assessing loads

Risk Assessment – Management

F. Evaluate defects
    1. Likelihood of failure
    2. Branch attachments and associated defects
    3. Trunk defects and conditions
    4. Root defects and conditions
    5. Decay
    6. Cracks
    7. Tree architecture
G. Conduct a tree risk evaluation
    1. Risk categorization
    2. Rating risk
    3. Risk evaluation
H. Recommend risk mitigation options
    1. Target management
    2. Creation of wildlife trees
    3. Residual risk
    4. Safety
    5. Recommend mitigation priorities
    6. Timelines
I. Generate tree risk assessment reports
    1. Detailed written reports
    2. Verbal reports
    3. Limitations of tree risk assessment
    4. Inspection intervals

Safety – Management

Draws 11 Questions

A. Use personal protective equipment
    1. Extremities
    2. Sensory
B. Employ standards, laws, and regulations
    1. Occupational safety and health administration (OSHA), CanOSH, and/or applicable standards
    2. ANSI Z133.1
    3. Record keeping
    4. Underground utility mark-out services
    5. Storage and handling
C. Employ safe work and work site practices
    1. Training
    2. Clear workspace
    3. Safety cones and signage
    4. Traffic and pedestrian control
    5. Pre-climb checklist and tree inspection
    6. Rope and equipment inspection
    7. Vehicle inspection and maintenance
D. Employ communication and oversight
    1. Job site safety analysis
    2. Crew leader
    3. Climbers and ground crew
E. Use tools and equipment safely
    1. ANSI A133.1 and/or applicable standards
    2. Equipment selection
    3. Working strengths
F. Judge electrical hazards
    1. Voltage, conductors, and clearance
    2. Telecommunications
    3. Grounding and guying systems
    4. Electrical hazard and awareness program
G. Apply emergency response procedures
    1. Cardio pulmonary resuscitation and first aid training
    2. Aerial rescue
    3. Shock
    4. Heat and cold
    5. First aid kit
    6. Poisonous plants and venomous animals

Tree Preservation – Management

Draws 10 Questions

A. Plan for the preservation and conservation of trees
    1. Consult stakeholders
    2. Conduct a survey of trees and geographic feature
    3. Assess trees and landscape for preservation and conservation
    4. Identify protection zone(s)
    5. Assess potential construction impacts
B. Design using best management practices to minimize impacts to trees
    1. Grading and drainage considerations
    2. Placement and design of structures
    3. Placement of roads, utility corridors, and machine corridors
    4. Pavement and sub-grade considerations
    5. Landscape design and plant selection
    6. Construction specifications and practices
    7. Timelines
C. Prescribe pre-construction treatments
    1. Treatments to improve tree and landscape health
    2. Clearance for construction activities
    3. Physical tree and landscape protection measures
D. Monitor tree protection during construction
E. Use tools and equipment safely
    1. Remedial actions
    2. Maintenance