NCEES_Principles_and_Practice_of_Engineering_Examination

AGRICULTURAL AND BIOLOGICAL ENGINEERING

DAY	Topic/ Number of Questions	Knowledge Area	√	DAY	Topic/ Number of Questions	Knowledge Area	√
1	1. Common System Applications 18–27	A. Pump principles (e.g., type, materials, sizing, selection)		45	3. Process Engineering 13–19	H. Fuel characteristics (e.g., energy values, products of combustion, emissions, storage, efficiency)	
2		B. Energy balances		46		I. Applied psychrometric processes (e.g., grain drying, livestock environments, dehydration, crop water use, evaporation)	
3		C. Piping systems (e.g., gravity, pressure, components, layout)		47		J. Mass balances	
4		D. Energy sources (e.g., fossil fuels, solar, wind, biomass, hydro)		48	Rest	Rest	
5		E. Engineering economics analysis (e.g., life-cycle costs, budgeting, replacement decisions, benefit-cost, time value of money, fixed and operating costs)		49	4. Facilities 13–19	A. Animal facilities (e.g., total confinement, pasture, open feedlots, runoff control, layout, animal comfort, space, manure systems, mortality management)	
6	Rest	Rest		50		B. Plant facilities (e.g., environment, space requirements, lighting, nutrients)	
7	1. Common System Applications 18–27	F. Engineering graphics (e.g., drawings, maps, schematics, nomographs, charts, CAD, GIS)		51		C. Biomaterials processing and storage facilities (e.g., food additives, biofuels, digestion, fermentation, algae growth, grain handling)	
8		G. Environmental assessment techniques (e.g., standards, methods, reporting, sampling)		52		D. Building materials (e.g., strength, corrosion resistance, moisture resistance, durability, concrete mixes, steel, aluminum, lumber, composites)	
9		H. Health and safety (e.g., operating procedures, manuals, human exposure, operator interface, protective devices)		53		E. Foundation design (e.g., soil bearing strength, drainage, loading, reinforcement)	
10		I. Statistics application (e.g., experimental design, manufacturing and process control)		54	Rest	Rest	
11		J. Stress-strain relationships (e.g., deflection analysis, material strength, failure analysis)		55	4. Facilities 13–19	F. Post-frame building design (e.g., livestock shelters, bulk material storage, packing sheds, warehouses)	
12	Rest	Rest		56		G. Structural analysis (e.g., one- and two-story buildings, bins, silos, retaining walls, waste storage)	
13	1. Common System Applications 18–27	K. Process analysis (e.g., efficiency, capacity, performance, durability, cost per ton)		57		H. Ventilation rate requirements (e.g., heat removal, moisture removal, gas removal)	
14		L. Energy use assessment (e.g., windows, insulation, lighting, latent and sensible heat)		58		I. Ventilation system requirements (e.g., air distribution, fan selection, control strategy, natural and/or mechanical, pressure drop)	
15		M. Materials selection (e.g., corrosion resistance, weight, elasticity, cost, strength, machinability, constructability)		59		J. Structural specification/codes and standards (e.g., wood, steel, and concrete; dead, live, snow, and wind loads)	
16		N. Regulated materials handling, storage, and disposal (e.g., facilities, equipment, storage volumes, practices/procedures, codes and standards, containment, permeability of materials, composting, incineration)		60	Rest	Rest	
17		O. Air-quality requirements (e.g., odor, gases, particulate matter, pathogens, emissions inventory)		61	5. Machines 13–19	A. Hydraulic power component performance (e.g., pumps, motors, conduit, pipe size, valves, cylinders, logic controls)	
18	Rest	Rest		62		B. Hydraulic circuit analysis (e.g., heat generation, pressure drop, constant pressure, constant flow, load sensing, unloading, sequencing)	
19	1. Common System Applications 18–27	P. Codes, regulations, and standards in specific areas of practice (e.g., air quality, water quality, fire protection, EPA, ANSI, ASABE, NIOSH, GMPs, HACCP, IBC, NRCS, NEC)		63		C. Internal combustion engines (e.g., power curves, specific fuel consumption, power density, combustion cycles, efficiency)	
20		Q. Electrical circuits and controls (e.g., determining load, conductor selection, controls, overload protection, grounding, power factor)		64		D. Electric motors (e.g., AC, DC, variable-frequency drives [VFDs], single-phase, three-phase, capacitor start)	
21		R. Sensors, instrumentation, data loggers, and control circuits and devices (e.g., criteria for selection, application)		65		E. Kinematic modeling (e.g., relative position, velocity, acceleration, clearance)	
22	2. Natural Resources and Ecology 13–19	A. Ecological processes (e.g., interaction of plant/animal/microbial communities, constructed wetlands, stream restoration)		66	Rest	Rest	
23		B. Erosion control and soil stabilization (e.g., risk analysis, conservation practices, basin design)		67	5. Machines 13–19	F. Machine and component power requirements (e.g., electrical, hydraulic, mechanical, pneumatic)	
24	Rest	Rest		68		G. Machines for materials handling/conveyance (e.g., milking, feed handling, waste handling)	
25	2. Natural Resources and Ecology 13–19	C. Hydrology (e.g., precipitation, infiltration, runoff, flood routing, ground water, hydrographs, ET)		69		H. Machines for offroad/field use (e.g., harvesters, planters, sprayers, heavy equipment, tillage equipment)	
26		D. Irrigation principles (e.g., application methods/devices, efficiency, uniformity, pipeline design, pumping systems, evapotranspiration, rate, timing)		70		I. Machines for processes (e.g., mills, grinders, coolers, separators)	
27		E. Nutrient management/loading rates in soils (e.g., budget, CNMP principles, crop nutrient uptake, vegetative treatment areas)		71		J. Mechanical power transmission (e.g., chains, belts, clutches, gears, shafts, CVT, pulleys, U-joints)	
28		F. Open-channel hydraulics (e.g., natural and constructed channels, energy dissipation structures, partially filled conduits, weirs and flumes)		72	Rest	Rest	
29		G. Soil-water relationships (e.g., gravimetric water content, volumetric water content, potential)		73	5. Machines 13–19	K. Performance analysis of a machine (e.g., efficiency, throughput, suitability, purity)	
30	Rest	Rest		74		L. Machine stability analysis (e.g., stationary, in-motion or moving)	
31		H. Surface and subsurface drainage		75		M. Structural analysis of machine components (e.g., power transmission systems and drive trains, frames)	

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32	2. Natural Resources and Ecology 13–19	I. Engineering surveying principles (e.g., topographic, stakeout, GPS, cuts and fills, interpretation)		76		N. Component design (e.g., structural elements, functional elements, fasteners, screw elements, shafts, weld design)	
33		J. Soil mechanics principles (e.g., forces, bearing capacity, shear strength, compaction, slope stability)		77		O. Electronic integration (e.g., measurement and control, remote sensing, circuit components, geospatial guidance systems)	
34		K. Soil physics principles (e.g., infiltration, moisture content, soil physical properties, shrink-swell)		78	Rest	Rest	
35		L. Sediment processes (e.g., detachment, transport, deposition)		79		Test,Review	
36	Rest	Rest		80		Test,Review	
37	3. Process Engineering 13–19	A. Biological and chemical kinetics (e.g., rates, yields)		81	Test,Review	Test,Review	
38		B. Biological transformation (e.g., fermentation, biofiltration, nitrification, denitrification)		82		Test,Review	
39		C. Bulk solids characterization (e.g., angle of repose, constitutive relationships, coefficient of friction, density)		83		Test,Review	
40		D. Mass transfer between phases (e.g., drying, extraction, leaching, evaporative cooling)		84	Rest	Rest	
41		E. Physical and chemical properties of biological materials (e.g., rheology, thermal properties, electrical properties, optical properties, corrosion, mixability, contamination, compatibility, water activity, D-value)		85	Exam	Exam	
42	Rest	Rest					
43	3. Process Engineering 13–19	F. Physical/chemical separation processes (e.g., filter selection, settling, distillation, ion exchange, decanting, centrifugation)					
44		G. Reactor vessel design (e.g., types, sizing, mixing, materials)					