POSS Exam — Quick Reference

EEI Plant Operator Selection System · Mechanical · Reading · Math · Graphs

Mechanical Reasoning

Concept	Rule / Formula	Key Takeaway
Lever	F_e × d_e = F_l × d_l	Balance force × distance
Gear ratio	T_driven / T_driver	Large driven = slower, more torque
Pulley MA	# supporting ropes	More MA = more rope pulled
Hydraulic jack	F1/A1 = F2/A2	Bigger piston = more force, less travel
Simple machines	Trade force for distance	Never get both

Fluid Flow & Pumps

Concept	Formula / Rule	Application
Volumetric flow	Q = V × A	Flow = velocity × area
Velocity-area	Smaller pipe → higher velocity	Continuity of mass flow
Centrifugal pump — flow	Q ∝ impeller speed (N)	Double the speed, double the flow
Centrifugal pump — head	H ∝ N^2	Double speed, quadruple head
Centrifugal pump — power	P ∝ N^3	Double speed, 8× the power
NPSH available	Suction pressure − vapor pressure	Must exceed NPSH required to avoid cavitation

Heat, Steam & Thermodynamics

Term	Definition	Plant Example
Sensible heat	Temperature change, no phase change	Heating feedwater
Latent heat	Phase change, no temperature change	Boiling water to steam
Saturated steam	At boiling temperature for given pressure	Turbine inlet steam

Superheated steam	Above saturation temp	Better for turbines; more energy, no droplets
Heat flow	Always hot → cold	Never reverses on its own

Operator-Level Electricity

Formula / Rule	Equation	Notes
Ohm's law	V = IR	Voltage = current × resistance
Power	P = VI	Watts from volts × amps
Transformer ratio	V_p / V_s = N_p / N_s	Step-up V = step-down I
3-phase advantage	Power = √3 × V × I × pf	More power per conductor than 1-Ø

Math & Graph Skills

- Percent: % = (part / whole) × 100 · % change = (new − old) / old × 100.
- Ratios: 3:2 means 3 parts per every 2 parts.
- Algebra: isolate variable, do same to both sides, check by plugging back in.
- Line graphs show change over time; bar graphs compare categories; read both axes before answering.
- For reading comprehension, answer only from the text — outside knowledge is a trap. Eliminate "always/never" answers.

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