

CERTIFIED ENERGY MANAGER - CEM

CEM EXAM FLASH CARDS

208+ key terminology & study flash cards!

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Four main points of EP Act 1992



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Set up more stringent standards

1. 1st established minimum standards for HVAC equip, motors, and lamps
2. Industries could set their own standards or DOE would do it for them
3. Federal agencies could have long-term performance contracts, up to 25 years
4. Fed facilities had to install measures with PBP less than 10 years by 2005



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Three main points of EP Act 2005



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1. Made effective Jan 1, 2006 – 1st major legislation since EPAct 1992
2. Major thrust is energy production but some on efficiency & conservation
3. Significant impacts on Federal Energy Management (leading by example, largest purchaser of energy?)



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What Federal energy management important in EAct 2005?



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Fed gov't is largest energy user, making up 1.6% of energy use & \$10billion in the budget (just for buildings and facilities)
-Fed gov't is largest product purchaser, and federal sector leads by example



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EAct 2005 Item 102 and what EISA 2007 did

Energy Independence and Security Act



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Energy reduction goal of 2% from FY 2006 to FY 2015 (EISA 2007 changed to 3% - in order to reduce dependence on foreign sources)
- changed baseline year from 1985 to 2003
- DOE recommends new requirements for FY 2016-25



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EPAct 2005 item 103



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Installation of Photoelectric system
(authorizes funds for solar wall at DOE
Forrestal building)



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Tax Provisions for Energy Efficiency (and Conservation) & details on the deduction...



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credits for solar PV & hot water heating, new
bhomes, existing home improvements (high
efficient HVAC), residential fuel cell systems, fuel
cell & microturbine in a business

deductions for efficient commercial buildings
(\$1.80/sq ft buildings achieving 50% reduction in
annual energy cost - baseline from ASHRAE 90.1-
2001)



**credits on the tax directly, deductions on income
that is taxed

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Difference between Energy Codes & Standards



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A standard should be followed, a code **MUST** be followed. Codes are adopted by state and local gov't.
Std's are published by national organizations



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State Building Codes follow what standard?

commercial/residential



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ASHRAE 90 standard
American Society of Heatings,
Refrigerating, and AC Engineers
ASHRAE 90.1 for commercial
90.2 for residential



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Federal Sector mandates
what standard into which
code?



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ASHRAE 90.1 and 90.2 as specified in
Code of Federal Regulation 10 CFD 435



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Two ways to meet
ASHRAE 90.1 compliance



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1. Prescriptive & performance requirements
(watt/sq ft)

2. Minimum cost budget method (more
wattage means less usage from chiller...)



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ASHRAE 62, and Prescriptive & Performance Options



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Ventilation Standard
From 1999 & 2001: 20 cfm of outside air
per person (prescriptive). It was 5 before
and NOW is 17.
Must measure CO₂ in return ducts & keep
it below 1000ppm (performance).



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Demand Control Ventilation – from what standard, & details



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From performance side of ASHRAE 62,
requires sensors, control system, and
active damper. Control CO₂ to less than
1000ppm which is 700 above ambient



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How do states adopt energy codes? What are they for federal buildings?



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From energy standards, which are written in mandatory enforceable language so they're easily adoptable by gov't.

ASHRAE 90.1 and 90.2 used in 10 CFR 435



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International Energy Conservation Code is published by: and what type of code is it?



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Published by International Code Council
model energy code that makes allowances for different climates, written in mandatory enforceable language so it's easily adopted by gov't



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Indoor Air Quality, IAQ

Why Manage It & Which stds apply?



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Occupational Health & Comfort. Liability & Risk Management. Compliance. Impacts on Energy Use & Operating costs. Property management.

ASHRAE 55 (2004) thermal
ASHRAE 62 (2001) Ventilation



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LEED Green Buildings
include IAQ and ?



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Indoor Environmental quality.
includes other factors like lighting
levels, noise, controllability, etc



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What qualifies
acceptable IAQ?



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80% or more of occupants do not
express dissatisfaction



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What does ASHRAE 55
cover?
summer/winter
activity



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Thermal Environmental Conditions: temperature,
radiation, humidity, air movement. 80% or more must
be satisfied. Adjust for activity and clothing levels
- defines acceptable thermal comfort
- discuss additional enviro parameters to be
considered
- summer and winter comfort zones for temp and
humidity
guidelines for measurements



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**Certified Indoor Air
Quality Professional
details**



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By AEE.



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ARRA



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**American Recovery and
Reinvestment Act of 2009**



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Energy Independence and Security Act of 2007



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- CAFE to 35 mpg for combined fleet of cars and light trucks by 2020
- RFS - increases the gallons of renewable fuels per year
- establishes efficiency standards for motors, external power supplies, residential appliances
- national standards for light bulbs
- promotes smart grid



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Tax Deduction



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Subtracted from income before total
tax liability is computed



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Tax Credit



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- Subtracted directly from the total tax liability.
- Tax credits are 3 or more times more advantageous to taxpayer than deductions



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Energy Codes



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- Specify how building **MUST** be constructed or perform
- Written in mandatory, enforceable language
- States/local governments adopt and enforce codes



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Energy Standards



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- Describe how buildings **SHOULD** be constructed to save energy cost-effectively
- Published by national organizations
- Not mandatory, but serve as national recommendations



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ASHRAE



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American Society of Heating, Refrigeration, and Air Conditioning Engineers



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ASHRAE 90.1



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Energy efficient design for new buildings (Commercial)



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ASHRAE 90.2



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Energy efficient design for new low-rise residential buildings



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When DOE determines that a revision to a code would improve energy efficiency, each state has how long to review the energy provisions of its building code?



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2 Years



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Federal Sector must use these standards for all new Federal buildings, as specified in 10 CFR 435?



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ASHRAE 90.1 and 90.2



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ICC



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- International Code Council
- Maintains the IECC (International Energy Conservation Code) which is the MODEL ENERGY CODE



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ASHRAE Standard 62



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- Specifies minimum VENTILATION rates and indoor air quality that will be acceptable to human occupants and are intended to minimize the potential for health affects
- Applies to all indoor or enclosed spaces that people may occupy
- Considers chemical, physical, and biological contaminants that can affect quality



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Acceptable Indoor Air Quality



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-Air in which there are no known contaminants at harmful concentrations as determined by cognizant authorities and which a substantial majority (>80%) of those exposed do not express dissatisfaction



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Ventilation Design Standards for ASHRAE 62



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-IAQ Procedure
-Ventilation Rate Procedure



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ASHRAE 55



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Thermal comfort requirements
-Specifies conditions in which 80%
or the occupants will find the
environment thermally acceptable



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Why manage IAQ?



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- Occupant health, comfort, and productivity
- Corporate liability and risk mgmt
- Compliance with codes
- Impacts on energy consumption and operating costs



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CIAQP



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- Certified Indoor Air Quality Professional
- AEE certification
- Identifies persons with acceptable knowledge of the principals and practice of IAQ, related disciplines, and laws affecting IAQ



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IPMVP



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International Performance
Measurement and Verification
Protocol



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New Federal buildings do not have to meet the requirements of the ASHRAE Building Code. (T or F?)



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False



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All commercial buildings must provide how many CFM of outside air per person to meet the ASHRAE Ventilation Code (62) in offices on a prescriptive basis.



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15 CFM



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ASHREA 62 requires a
detailed pollutant study
for all commercial
buildings for compliance.
(T or F?)



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False



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Industrial cogeneration
use is mostly affected by
which piece of
legislation?



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PURPA – Public Utilities Regulatory
Policy Act



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What is an alternate
refrigerant to CFC-114?



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HCFC-124



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"Pooling" of purchases
by small firms is
disallowed under the
small business exclusion
section of the Natural
Gas Policy Act. (T or F?)



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False



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Model Energy Code



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-In ICC - International Code Council code
-Maintained by ECC - International
Energy Conservation Code



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ASHRAE 135



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Defines data communication service
and protocols for computer
equipment used to monitor and
control building systems



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IESNA



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Illuminating Engineering Society of
North America



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IAQ Procedure
(Ventilation Design
Standard for ASHRAE
62)



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- Lists all known contaminants and their respective concentration
- Risky, vague, ambiguous
- Not all contaminants are listed in Standard 62
- Can still be overridden if >80% still find the air offensive



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Ventilation Rate Procedure (Ventilation Design Standard for ASHRAE 62)



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- Designers can guarantee acceptable air quality by providing adequate outdoor air ventilation
- Ventilation (flow) rates must be maintained under all conditions
- Can be measured directly or indirectly by measurement of CO₂
- Standard 62 also provides criteria for clean outside air that will provide the ventilation



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Air Mixing Formula



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$$T_{mix} = (\% \text{ hot air} \times \text{high temp} + \% \text{ cold air} \times \text{low temp}) / 100$$



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VOC



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class of organic chemicals that have a high enough vapor pressure at normal temperatures to vaporize and enter the atmosphere



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Three ways to improve IAQ



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1. Filtering – best for particles (pollen, organisms, dust, smoke)
2. Prevent the introduction of VOCs
3. Provide the prescribed ventilation to dilute whatever is introduced



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Depreciation Methods allowed by IRS



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1. Straight Line Depreciation (simplest and most common)
2. Declining Balance Method (more realistic)
3. Sum of Years (somewhat complicated)



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Straight Line Depreciation Method



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- Simplest and most common
- Portion of the cost is spread out in equal installments over the life of the investment
- Salvage is subtracted from initial cost



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Declining Balance Depreciation Method



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- Uses accelerated depreciation: more of the value is deducted early in the life of the investment
- More realistic approach because the value of most capital assets follow this trend



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Sum of Years Depreciation Method



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- Uses accelerated depreciation
- Based on the fraction of the useful life remaining



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BTU



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British Thermal Unit
BTU=3,400 kWh electric
BTU=100,000 therms natural gas
BTU= ~1,000 CF natural gas



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Efficiency Formula



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Efficiency=(Energy or Work
Out)/Energy In



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Purpose of Energy Audit



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1. Quantify energy used
2. Evaluate energy usage by comparing it to standards
3. Identify areas where energy conservation could save money and resources



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Load Factor (aka Demand Factor)



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Peak electrical load/average load
for a given period
-higher the load factor, the more
efficient the facility is operating



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Combustion Process



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Input: fuel and oxygen
Output: unused oxygen, CO₂, CO, and
unburned fuel



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Types of Combustion Analyzers



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Orsat Analyzer - measures the relative
concentration of individual components of
exhaust gas at once
Fyrite Analyzer - measures the
concentration of individual components
(only one) of exhaust gas



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Reactive Power



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Occurs when the power factor is less than 1
-Units: volt-ampere reactive (var)



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Phasor Diagram



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Phase relationship between AC voltage and current (aka real, reactive, and total power)



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When the power factor is
less than 1, the load is ?



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Reactive



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Power Factor Correction
Objective



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Make the power factor as close to
1 as possible



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Power Factor Correction Approaches



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- Passive - connect a bank of capacitors in parallel with the load
- Active - an electronic circuit monitors the phase angle of the load current and adjusts the current to a counteracting reactive load (active correctors can hold the power factor to within 1% of unity)



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Entropy



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The fundamental property of energy to evenly spread out over available space.



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Temperature Measurement Tools



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- Thermometer
- Bimetallic strip
- Electronic Thermometers (thermistor, thermocouple, or pyrometers)



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Air Velocity Measurement Tools



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- Pitot tube (measures pressure)
- Anemometer (measures air velocity, i.e., rotating cups)



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Pressure Measurement Tools



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-Manometer
-Bourdon Tube



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Light Measurement



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-Foot Candle Meter
-Light Meters (measures
illumination)



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Light Intensity



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- Measured in Foot Candles (foot-candle = the intensity of a standard candle at a distance of one foot)
- Metric unit = lux = ~10 foot candles



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Illumination, or Luminous Flux Definition



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Measure of visible light emitted from a device measured in lumens



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Humidity Measurement Tool



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-Hygrometer
-Psychrometer (type of hygrometer)



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Infrared Measuring Tools



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-Used to identify heat loss
-Infrared radiation intensity is directly
related to the temperature of the
surface being measured



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Electric and Power Measurement Tools



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- Wattmeter (measures power)
- Calculated from measurements of voltage and current
- Ammeter (measures current)
- Power factor meter (evaluates the relative phase of voltages and currents)



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HHV and LHV



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- HHV - Higher Heating Value - the full energy content of fuel including all products of combustion
- LHV - Lower Heating Value - omits the energy in the water vapor that is formed during combustion (typically about 10% less than HHV)



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EUI



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Energy Use Index
BTUs per conditioned square foot
per year



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ECI



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Energy Cost Index
Energy cost in dollars per
conditioned square foot per year



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Four factors in choosing a fuel:



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1. Cost and Availability
2. Type of appliances and devices that
can be used with it
3. Fuel and Device efficiencies
4. Environmental Impacts of the fuel use



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Energy Density Units



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-Joules/kg
-BTU/lb



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Which of the following regulations was not part of the Energy Policy Act of 2005?



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The requirement to reduce energy use in federal buildings by 30% was in the Energy Independence and Security Act of 2007.



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Which Act required utilities to purchase power generated by qualifying cogeneration facilities?



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PUPA was enacted in 1978 and resulted in areater development of cogeneration and renewable energy facilities. PUHCA dates from 1935 and allowed the Securities and Exchange Commission to regulate utility holding companies; it was repealed in 2006 after the Energy Policy Act of 2005 was passed.



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What is the maximum interest rate an organization should accept if it is to finance an energy saving product that saves \$20,000 per year over its useful life of 10 years if the initial cost is \$112,000?



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The present worth of the investment (P) is \$112,000 and the uniform series of savings (A) is \$20,000 over 10 years (n). Therefore, the interest rate should be chosen so that the uniform series present worth factor (P/A) is greater than $\$112,000 / \$20,000 = 5.6$. The interest rate table with an interest factor in row n=10 that is the closest value greater than 5.6 is 12%, which has an interest factor of 5.65. At a rate of 12% the maximum investment they could make for the annual savings over 10 years to equal the initial investment, and therefore break even, is $\$20,000 \times 5.65 = \$113,000$.



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If a new building earns 41 points in the LEED rating scale, what level of certification will it receive?



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A building that earns 40 to 49 points is eligible to become LEED Certified.



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Which of the following methods is not a method of depreciation?



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Life-cycle cost is a method of determining the total cost of ownership over the life of a product with consideration to the value of money over time.



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Which organization develops and maintains the LEED green building rating system?



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The US Green Building Council develops and maintains the LEED rating system.



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For a given period of time, what is the ratio of the average energy consumption in a facility divided by the peak demand in the facility called?



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The load factor of a building indicates the shape of the daily demand profile. A high load factor indicates a relatively high base load relative to the peak, while a low load factor indicates a period with a relatively high peak load.



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Which of the following is a potential application for an infrared camera?



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Infrared thermography can be utilized to find excessively hot or cold areas in electrical systems, mechanical equipment, and the building fabric.



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In which Energy Savings Performance Contract structure will an Energy Services Company (ESCO) pay the customer if the savings are less than expected?



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An assured savings ESPC requires the ESCO to cover any savings shortfall. Frequently, a provision is made so that a portion of any surplus savings can be set aside to help cover future deficits.



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Which of the following is not typically part of a lender's risk assessment of an Energy Savings Performance Contract?



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The value of the customer's energy savings is irrelevant to the lender, who is only concerned with receiving the loan repayment. The customer's ability to repay the loan is contingent upon their creditworthiness, the likelihood that the project will succeed and generate savings, and the contract's terms, including the duration of the contract, how savings are calculated, and how they are distributed.



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When a capacitor bank is added to an electrical system with a lagging current, the power factor is increased because



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Inductive loads cause a lagging current by increasing the reactive power necessary to produce the magnetizing field required for their operation. Capacitor banks draw a current that precedes the voltage, which can reduce the total reactive power that must be supplied.



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Proper grounding in a facility will help to maintain



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Up to 80% of power quality problems can be attributed to inadequate grounding and wiring systems. Grounding of electrical systems should be inspected for loose connections or configurations that do not meet current standards to help maintain power quality.



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Which of the following solutions for use in a variable volume system has power input performance most closely matched to a variable frequency drive?



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Eddy current drives are comparable to variable frequency drives in their ability to control motor speed. They produce no harmonics but are hefty and cumbersome on the motor shaft.



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Which of the following is not a combined heat and power system operating cycle?



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A combustion cycle is a process for the combustion of a fuel, such as in an internal combustion engine, which may be the type of engine used in a CHP unit, but it is not a CHP system's operating cycle. A topping cycle generates electricity and recovers waste heat primarily. The primary output of a bottoming cycle is thermal energy, while residual thermal energy is converted into electricity. A combined cycle produces two stages of electricity and recovers thermal energy.



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Which instrument is used
to monitor O₂ and CO in
flue gas?



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Combustion analyser



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A lux metre is used to
measure the



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Illumination level



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“The judicious and effective use of energy to maximise profits and enhance competitive positions”. This can be the definition of:



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Energy management



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The ratio of current year's production to the reference year's production is called as. (EA/EM)



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Production factor



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What is the most important parameter to monitor when adjusting the position of the outside air damper using demand control ventilation?



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Return air carbon dioxide (CO₂) level



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What approach is most likely to reduce life cycle cost?



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Improve system efficiency



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Kilowatts are a unit of energy consumption, whereas kilowatt-hours are a unit of power consumption.



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False. Power is expressed as kW and Energy is expressed as kWh. Power is a “rate of flow”.



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A flue gas analyzer is used to determine how many of your steam system\'s steam traps have failed.



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False. A Flue Gas Analyzer will tell you the efficiency of combustion, but will not tell you the volume of steam or really any information about what is happening downstream within the steam system.



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It is impossible for heat recovery systems (heat exchangers) to reduce temperatures below the hot gas\'s dew point.



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When the flue gases temperatures are reduced below the dew point, they will condense... (lets hope that you have a condensing boiler).



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Thermal Energy Storage using ice as the storage medium is accomplished primarily through latent heat storage.



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True. The “phase change” energy allows more Btu to be stored (or liberated) in energy storage applications.



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At high pressure, the
refrigerant is absorbed in
an absorption cycle.



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It is absorbed at low pressure



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If hot air is sensibly cooled, its
relative humidity increases:



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Remain constant



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For cool roofs, the
following properties are
the most important:



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Emissivity and solar
reflectance



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Air compressor alone
consumes about
_____ of the energy
generated in a gas turbine



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50-60%



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Find the thermodynamic cycle not related to cogeneration.



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Bell-Coleman cycle



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The savings from a performance contract on a university campus are approximately 8.5% of the utility meter's annual billing. The suggested M&V options for a best-fit application would be



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Options A, B, or D



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When a building\'s energy use data is sent to the Energy Star Portfolio Manager benchmarking tool, that building\'s score is not found by comparing it directly to other buildings that have been entered into Portfolio Manager.



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TRUE



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The amount of energy used by any business varies depending on the manufacturing process, volume, and input.



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TRUE



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Material and energy
balance will identify
areas to concentrate on
for energy conservation.



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True



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The tool used for performance
assessment and logical evaluation
of avenues for improvement in
Energy management and audit is



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Benchmarking



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Global warming is due
to release of



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Greenhouse Gases



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The main constituents of
Greenhouse gases (GHG) are
on earth surface are



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CO₂, CH₄



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What document helps the most
when writing functional test
procedures to find the acceptance
criteria?



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Design intent



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The functional testing
programme verifies that the
interoperation of the building
systems is in accordance with
the



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Project Documents.



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What are the merits of 'LED lamps' over 'filament lamps'?



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- Less power consumption (less than 1Watt/lamp)
- Withstand high voltage fluctuation in the power supply
- Longer operating life (more than 100000 hours)



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Installation of Variable frequency drives (VFD) allows the motor to be operated with _____.

Lower start-up current



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A new pump will replace an older pump. The energy consumption of the old pump is measured both before and after the completion of the project. Before beginning the project, the operating hours are determined. Which IPMVP option does this represent?

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Option A

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Where judgements have to be made in analysing data or making assumptions about uncertain quantities, the M&V analyst should make choices that tend to underestimate the reported energy savings.

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True

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When a 15 percent load is applied to an electric AC induction motor, the power factor is relatively high.



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False



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A closed loop air heat pump system will be retrofitted into a large commercial building. Each department will have its own metre for measuring costs. Demand billing accounts for a small portion of the total cost of electricity. Would you suggest a TES?



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No



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The ratio between the number of turns on the secondary to the turns on the primary of a transformer is known as:



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Turns ratio



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The required size of an air conditioner for a 12-foot-by-12-foot living room at the residence is



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1 to 1.5 TR



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The sum of individual maximum demand of the plant to the sum of individual maximum demand of various equipments is _____.



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Diversity Factor



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Through energy efficiency, energy imports will be reduced, which helps in conserving limited resources and lead to improved energy security.



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True



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Final energy consumption is the actual energy demand at the user end. This is the difference between primary energy consumption and the losses that takes place in transport, transmission, distribution and refinement.



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True



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Energy consumption per unit of GDP is called as:



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Energy intensity



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Which of the following is highest contributor to the air pollution?



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Carbon Monoxide



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In project management system, Critical Path Method (CPM) allows for randomness activity completion time deterministic method while Programme Evaluation Review Technique (PERT) uses fixed time estimate for each activity.



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False



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Regenerative furnaces are those that have the highest preheating of air temperature in relation to waste heat recovery systems.



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True



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In the case of furnace performance, "infiltration" is less harmful than "exfiltration" when compared on energy efficiency aspects.



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False



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“_____ commissioning” is the commissioning activity that frequently monitors the system or facility over time to determine when maintenance needs to be performed again.



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Continuous or real-time commissioning



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What are three driving factors for major investments that relate to energy?



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Environmental regulations, productivity, and quality improvement



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What type of steam is generally used for power generation/application.



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High pressure steam with super heat



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What would be used to find phase imbalances in an AC circuit?



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Voltmeter



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_____ determines the rating of capacitance connected in each step during the first hour of its operation and stores them in memory.



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Intelligent power factor controller



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ESCOs are usually companies that provide a complete energy project service, from assessment to design to construction or installation, along with engineering and project management services, land financing.



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True



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In material and energy balance,
cycle time play an important
role.



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True



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Thermal Conductivity of the
refractories has an effect on
heat losses from furnace
walls.



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True



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In calculating heat flows,
metal generally provides little
resistance to heat flow
compared to insulation or even
air films.



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True



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What distinguishes the
conditions under which the
controller operates in one
position from the conditions
under which it switches to the
other position?



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Differential



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Which type of heat transfer is described as “transfer of heat due to a moving fluid\?”



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Convection



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Recovery of heat from dryer exhaust air is a typical application of



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Heat wheels



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Water treatment for steam boiler is generally required to:



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Avoid the formation of scales



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What are the factors to be considered before procuring fuels for energy efficiency and economics?



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- **Price at source, transport charge, type of transport**
- **Quality of fuel**
- **Energy content**



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Infrared thermometer is
used to measure



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Surface temperature



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CO₂ measurement of
Fyrite kit is based on (EA)



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Volume basis (dry)



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The main disadvantage of
use of HFCs and HCFCs
compared to use of CFCs
is _____



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Low Efficiency



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COP of absorption
refrigeration systems



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less than 1.1



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In water cooled
refrigeration systems,
condenser cooling water
temperature should be
close to:



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wet bulb temperature



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Centrifugal compressors
are most efficient when
they are operating
at_____.



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Full load



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The required A/C size for
comfort conditions for
general living room (12 ft x
12 ft) at residence
is_____.



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1 to 1.5 TR



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In which range of
temperature the
application of 'brine
plants' are made use of?



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'Brine plants' are used for typically
sub zero temperature applications.



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_____ determines
the rating of capacitance
connected in each step during
the first hour of its operation
and stores them in memory.



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Intelligent power
factor controller



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List out any two types of
vapour absorption chillers
based on the refrigerant-
absorbent combination.



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- Lithium bromide- water (LiBr-H₂O) cycle ☒
- Ammonia- Water (NH₃-H₂O) cycle



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What determines the thermal loading on the motor?



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Duty/Load cycle



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Application of DC motors is generally restricted to a few load speed applications because of _____.



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problems with mechanical commutation



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**Name any three instruments
required for performance
evaluation of a furnace**



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**The instruments used for
performance evaluation of a
furnace are Flue gas
analyser, infrared pyrometer
and draft gauge.**



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**What happens if the
flames impinge on
refractories in a furnace?**



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**If the flames impinge on
refractories, the incomplete
combustion products can settle and
react with the refractory
constituents at high flame
temperatures resulting in damage
to refractories.**



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What could be the range of energy saving potential from co-generation systems?



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Co-generation offers energy savings in the range of 15-40% when compared against the supply of electricity and heat from conventional power stations and boilers.



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What is the function of 'back pressure steam turbine'?



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In back pressure steam turbine steam enters the turbine chamber at high pressure and expands to low or medium pressure. Enthalpy difference is used for generating power/work.



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What do you mean by heat duty of a heat exchanger?



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Heat duty of a heat exchanger is defined as the heat that is transferred from hot fluid to cold fluid per unit time.



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Presenting the load demand of a consumer against time of the day is known as_____.



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Load curve



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The kVAr rating required for improving the power factor of a load operating at 500 kW and 0.85 power factor to 0.95 is _____.



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145 kVAr



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The heat input required for generating 'one' kilo watt-hour of electrical output is called as ____.



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Heat Rate



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Core losses in transformer
are caused by _____.



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- Hysteresis loss
- Eddy current loss



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The load losses in transformer
vary according to
_____.



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Square of loading of transformer



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The speed of the motor can be varied by ____.



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- Changing supply frequency
- Changing no. of poles
- Using multi speed windings



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Which of the following are ill suited for energy efficient motors application?



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Punch Presses



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Which of the following
information available on
name plate of a motor?



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- HP rating
- RPM
- Frame model



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Higher COP can be
achieved with_____.



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Higher evaporator temperature and
Lower condenser temperature



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The specific energy for a centrifugal chiller producing chilled water at 5.5 °C and condenser water temperature around 30 °C is the order of:



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0.65–0.8kW/TR



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What are the commonly used refrigerants for vapour compression chillers?



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Commonly used refrigerants for vapour compression chillers are chlorinated fluorocarbons (CFCs, also called Freons): R-11, R-12, R-21, R-22, R-134 and R-502.



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Color rendering index of
incandescent lamp is:



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excellent when
compared to
fluorescent lamp



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What is the function of
Luminaire in a lighting
system?



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Luminaire is a device that
distributes filters or transforms the
light emitted from one or more
lamps.



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Energy savings potential of
variable torque
applications compared to
constant torque application
is:



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higher



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Electronic soft starters
are used for motors to:



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provide smooth start and stop



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Name the predominant loss component for furnace oil fed boiler.



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loss due to dry flue gas



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Controlled wetting of coal (during the coal preparation) would result in



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decrease in the percentage of unburnt carbon



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The elements of ultimate
analysis of fuel does not
include



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volatile matter



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Steam is not desirable among
the choice given below from
process heating application
point of view for drying
application will be less if we
heat with



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superheated steam



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In indirect steam heating,
.....heat is
utilised for heating
application.



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Latent



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For flash steam
calculation, flash steam
quantity available
depends upon ____



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Condensate pressure and flash
steam pressure



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Enthalpy of evaporation is
also known as latent heat.



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True



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Proper sizing of steam
pipeline helps in
minimising



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pressure drop



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The major limitation of
metallic recuperator is ----



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limitation of reduced life for
handling temperature more than
1000 °C



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Typical waste gases
temperature from glass
melting furnace



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1000-1550 °C



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Economizer is provided to
utilize the flue gas heat
for _____



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Preheating the boiler
feed water



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Thermo-compressor is
commonly used for



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Flash steam recovery



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The benchmarking
parameter for air
conditioning equipment is



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kW/Ton of
Refrigeration



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Which instrument is used
to monitor O₂, CO in flue
gas?



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Combustion analyzer



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An energy policy does not
include



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Future production
projection



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The tool used for performance
assessment and logical
evaluation of avenues for
improvement in Energy
management and audit is



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Bench marking



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The empirical relationship used to plot production Vs Energy consumption is (Y= energy consumed for the period; C = fixed energy consumption; M = energy consumption directly related to production; X= production for same period).



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$$Y = Mx + C$$



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A CUSUM graph follows a random fluctuation trend and oscillates around.



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0



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The main source of CFCs in household sector is _____



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Refrigerators



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What is specific energy consumption?



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Energy consumed per unit of production



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The agency to look after the
climate changes and for
action to cut GHG _____



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UNFCCC



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Nameplate kW or HP
rating of a motor
indicates



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output kW of the motor



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