MCQ Question Solving Session-1

Subject: Energy Conservation and

Management

Subject Code: 2181916

Prof. Krunal Khiraiya

1.Which of the following terms does not refer to specific energy consumption

Specific → independent of mass

a) kWh/ton ✓

b) kCal/ton ✓

c) kJ/kg ✓

d) kg/kCal ✓

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b) kCal/ton

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d) kg/kCal

2. Which of the following GHGs has the longest atmospheric life time

a) CO2

b) Sulfur Hexafluoride (SF6)

c) CFC

d) Per FluoroCarbon (PFC)

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3. Which of the following comes under mandatory labeling programme

BEE → S&L

a) diesel Generators

b) Induction motors

c) Tubular Fluorescent Lamps ✓

d) LED lamps

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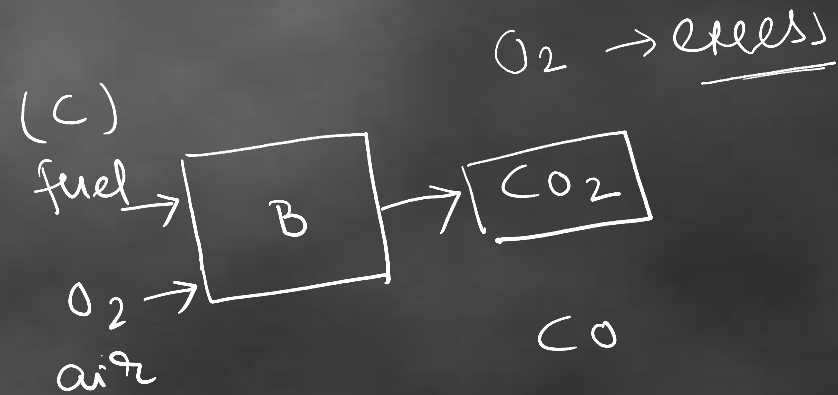c) **Tubular Fluorescent Lamps**

d) LED lamps

4. To improve the boiler efficiency, which of the following needs to be done

a) Maximize O2 in flue gas $\times$

b) Maximize CO2 in flue gas $\checkmark$

c) Minimize CO2 in flue gas

d) Maximize CO in flue gas $\times$

$O_2 \rightarrow$ excess

(c)

fuel $\rightarrow$ | B | $\rightarrow$ | CO_2 |

$O_2 \rightarrow$

air

CO

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a) Maximize O2 in flue gas

b) **Maximize CO2 in flue gas**

c) Minimize CO2 in flue gas

d) Maximize CO in flue gas

5. The quantity of heat required to raise the temperature of 1 kg of water by 1 oC is termed as

a) Latent heat ✗

b) one kilojoule ✗

c) one kilo calorie ✓

d) None of the above

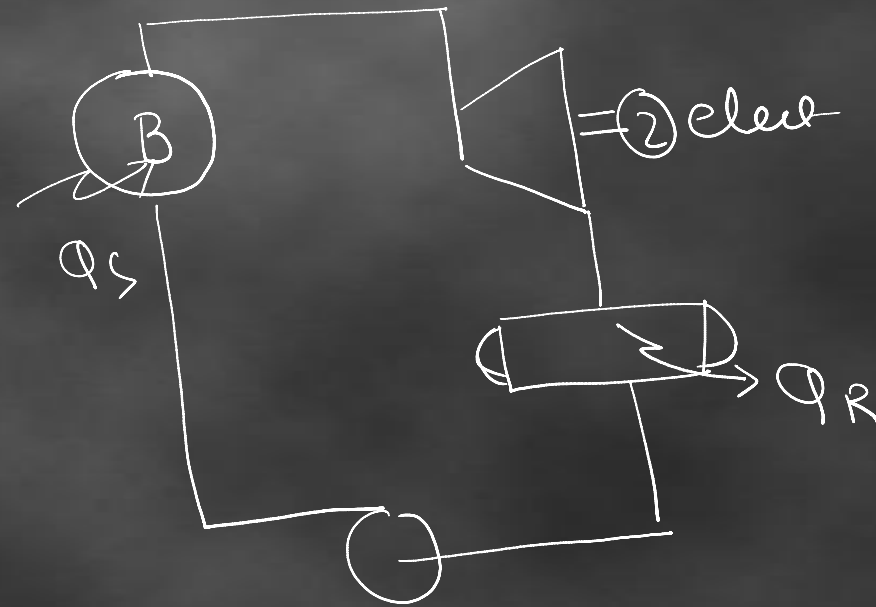$$\checkmark \; Q = m c_p \Delta T$$

$$c_p = \frac{Q}{m (\Delta T)} \; \frac{kJ/}{kcal} \; °c$$

(4.2)

kcal ①

5. The quantity of heat required to raise the temperature of 1 kg of water by 1 oC is termed as

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6. The major share of energy loss in a thermal power plant is in the

a) generator

b) Boiler

c) Condenser ✓

d) Turbine

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7. In India power sectors consumes about __% of the coal produced

a) 75%

b) 50%

c) 25%

d) 90%

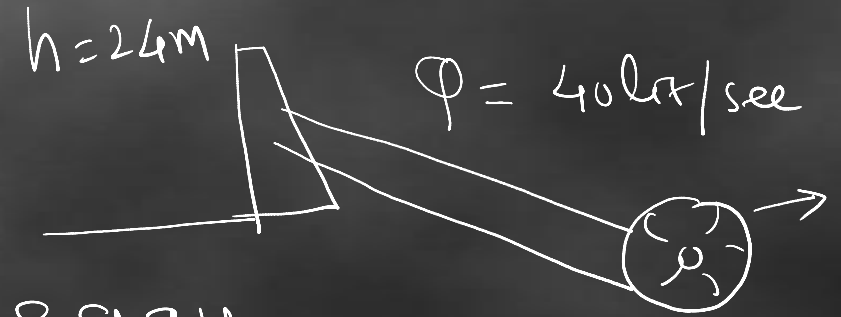7. In India power sectors consumes about __% of the coal produced

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8.How much power generation potential is available in a run of river mini hydropower plant for a flow of 40 liters/second with a head of 24 metres. Assume system efficiency of 60%

a) 5.6 kW

b) 9.4 kW

c) 4.0 kW

d) 2.8 kW

$h = 24m$

$\varphi = 40 \, lit/sec$

$P = \rho \, g \, Q \, H$

$= 1000 \times 9.81 \times 40 \times 10^{-3} \times 24$

$= 9417.6$

$\eta = \dfrac{O/P}{I/P}$

$O/P = I/P \times \eta$

$= 9417.6 \times 0.6$

$= 5650.6$

$= 5.65 \, kW$

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9.For expressing the primary energy content of a fuel in tonnes of oil equivalent (toe) which of the following conversion factors is appropriate

a) Toe=1x106 kcal

b) Toe=116300 kWh

c) Toe=41.870 GJ

d) All the above

$$Toe = 4.187 \times 10^{10} J$$
$$= 1.001 \times 10^{7} Kcal$$
$$= 11630 \ kWh$$

$$10^{9} \Rightarrow GJ$$

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10. For calculating Plant Energy Performance which of the following data is not required

a) Current year's production

b) Reference year's production

c) Reference year energy use

d) Capacity utilization X

$PEP = \dfrac{\text{Reference year energy use} - \text{Current year energy Con}}{\text{Reference year energy use}} \times 100\%$

P.D

Reference year eer = Reference year use
Con $\times$ P.D

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11.As per primary commercial energy consumption mix in India, the fuel dominating the energy production mix in India is

a) Natural gas

b) Oil

c) Coal
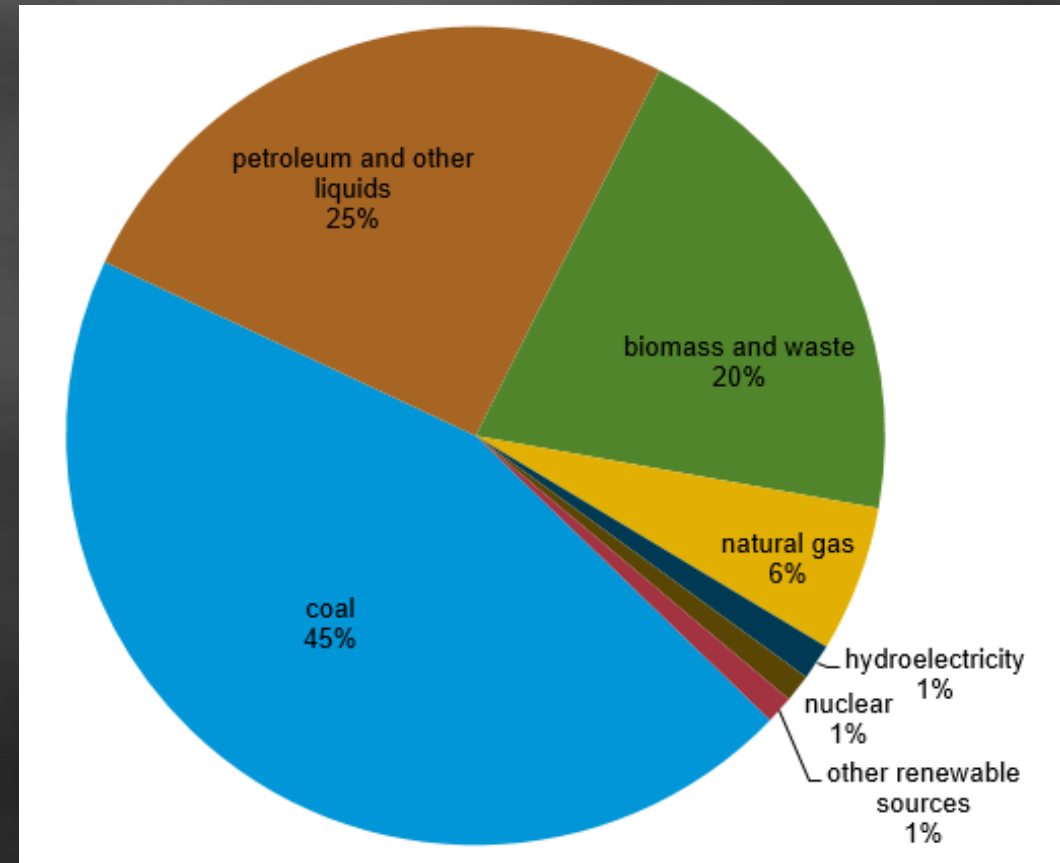
d) Nuclear energy

11.As per primary commercial energy consumption mix in India, the fuel dominating the energy production mix in India is

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d) Nuclear energy

12. An oil-fired boiler operates at an excess air of 6 %. If the stoichiometric air fuel ratio is 14 then for an oil consumption of 100 kg per hour, the flue gas liberated in kg/hr would be

a) 1484

b) 1584 ✓

c) 106

d) 114

Excess air = 6%

$m_{flry} = m_f + m_a$

= 100 + 1484

= 1584

$\phi = 14:1$

$m_f = 100$ kg/hr

$m_{flue\ gas}$

air Req (Theo) = $m_f \times \phi$

= 100 × 14 = 1400 kg

actual air Req = $(1 + \frac{EA}{100}) \times$ Theo

= (1 + 0.06) × 1400

= 1484

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b) 1584

c) 106

d) 114

13.Among which of the following fuels, the difference between the GCV and NCV is maximum

a) Coal

b) Furnace Oil

c) Natural gas

d) Rice husk

$$NCV = GCV - 24.44(9 \times \%H + \%M)$$

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b) Furnace Oil

c) Natural gas

d) Rice husk

14. A waste heat recovery system costs Rs. 54 lakhs and Rs. 2 lakhs per year to operate and maintain. If the annual savings is Rs. 20 lakhs, the payback period will be

a) 8 years

b) 2.7 years

c) 3 years

d) 10 years

Initial investment = 54 lakh

Annual O/P = 2 lakh

Annual saving = 20 lakh

$$SPP = \frac{Initial\ investment}{Saving - O/P} = \frac{54}{20-2}$$

$$= \frac{54}{18} = 3\ year$$

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15. A process requires 10 Kg of fuel with a calorific value of 5000 kcal/kg. The system efficiency is 80% and the losses will be

a) 10000 kcal

b) 45000 kcal

c) 500 kcal

d) 2000 kcal

$$\eta = \frac{O/P}{IP}$$

$$IP = MF \times CV$$
$$= 10 \times 5000$$
$$= 50,000 \, kcal$$

$$O/P = \eta \times IP$$
$$= 50,000 \times 0.8$$
$$O/P = 40,000 \, Kcal$$

$$loss = IP - O/P = 10,000 \, kcal$$

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a) 10000 kcal

b) 45000 kcal

c) 500 kcal

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16.A 400W lamp was switched on for 10 hours per day. The supply volt is 230V (current= 2 amps & PF= 0.8). What is the energy consumption per day

a) 3.68 kWh

b) 6.37 kWh

c) 0.37 kWh

d) 4.0 kWh

$$P = VI\cos\phi$$
$$= 230 \times 2 \times 0.8$$
$$= 368 \, W$$

Energy Con $= 368 \times 10$
$$= 3680 \, wh$$
$$= 3.68 \, kWh$$

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17. 100 tons of coal with a GCV of 4200 kcal/kg can be expressed in 'tonnes of oil equivalent' as

a) 42

b) 50

c) 420

d) 125

$\text{energy input} = 100 \times 10^3 \, \text{kg} \times 4200 \, \text{kcal/kg}$

$\qquad = 42 \times 10^7 \, \text{kcal}$

$1 \, TOE = 1.001 \times 10^7 \, \text{kcal}$

$\qquad = 42 \, TOE$

17.100 tons of coal with a GCV of 4200 kcal/kg can be expressed in 'tonnes of oil equivalent' as

a) 42

b) 50

c) 420

d) 125

18. Which of the following may <u>not</u> be a suitable energy security option for India?

a) Improving Energy Efficiency ✓

b) Increasing Jatropha Cultivation ✓

c) Increasing Renewable Energy use ✓

d) Increasing oil fired thermal power stations ✗

18. Which of the following may not be a suitable energy security option for India?

a) Improving Energy Efficiency

b) Increasing Jatropha Cultivation

c) Increasing Renewable Energy use

d) Increasing oil fired thermal power stations

19.India's proven oil reserves is about ____% of total world reserves

a) 0.1

b) 2

c) 0.4

d) 4

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   world reserves

a) 0.1

b) 2

c) 0.4

d) 4

20.Matching energy usage to requirement means providing

a) Just theoretical energy needed

b) Just the design needs

c) Energy with minimum losses

d) less than what is needed

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