

National Testing Agency

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Energy Systems Engineering

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Energy Systems Engineering

Section Id : 90958212
Section Number : 1
Section type : Online
Mandatory or Optional: Mandatory
Number of Questions: 100
Number of Questions to be attempted: 100
Section Marks: 100
Display Number Panel: Yes
Group All Questions: No

Sub-Section Number: 1
Sub-Section Id: 90958212
Question Shuffling Allowed : Yes

Question Number : 1 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Sun is a _____ source of energy.

- Primary
- Secondary
- Tertiary
- Depends on latitude

Options :

1. A
2. B
3. C
4. D

Question Number : 2 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

During the last 40 years (1977-2017), the share of renewables in the primary energy mix in India has _____.

- a. more than doubled from its earlier value
- b. increased by 10%
- c. decreased significantly
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 3 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the Paris agreement, India has agreed to _____.

- a. Reduce the usage of coal by 50% of its 2005 value in 2030
- b. Increase mass transit in cities (metros) to account for 50% of urban transport in 2030.
- c. Reduce the emissions intensity of GDP by more than one third of its 2005 value in 2030.
- d. All of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 4 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

India's energy imports as a proportion of the total energy supply has _____.

- a. been less than 10%
- b. been decreasing during the last ten years (2008-2018)
- c. remained more or less constant
- d. been increasing over the last ten years (2008-2018)

Options :

1. A
2. B
3. C
4. D

Question Number : 5 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Regarding cooking fuels in India, which of the following is true?

- a. The fuel mix for cooking is independent of the household income
- b. Households prefer biomass based cooking as it is more efficient than LPG
- c. Biomass based cooking is a major source of indoor air pollution
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 6 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A solar PV plant costs ₹20 lakhs to install and ₹2 lakh per year to operate and maintain. If the annual savings is ₹6 lakhs, the simple payback period is:

- a. 2.5 years
- b. 3 years
- c. 4.5 years
- d. 5 years

Options :

1. A
2. B
3. C
4. D

Question Number : 7 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a life cycle assessment study, if the use phase and the phases after the use phase are not included, it is referred to as:

- a. Cradle-to-cradle
- b. Cradle-to-gate
- c. Cradle-to-grave
- d. Cradle-to-disposal

Options :

1. A
2. B
3. C
4. D

Question Number : 8 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Discounted payback period does not consider:

- a. Time value of money
- b. Cash flows before the payback period
- c. Cash flows after the payback period
- d. Capital investment cost

Options :

1. A
2. B
3. C
4. D

Question Number : 9 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

With a capital investment cost of ₹ 1 lakh for a project and annual savings of ₹25,000 over a life of 20 years, the net present value of this project assuming a discount rate of 15 % will approximately be:

- a. ₹ 2,56,483
- b. ₹ 56,483
- c. ₹ 1,03,994
- d. ₹ 3,994

Options :

1. A
2. B
3. C
4. D

Question Number : 10 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

As per Rockström's classification, which planetary boundaries have we not yet crossed?

- a. Biodiversity loss
- b. Fresh water
- c. Atmospheric carbon dioxide
- d. Radiative forcing

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 11 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A _____ is used to measure diffused radiation on a horizontal surface:

- a. Pyranometer
- b. Pyrhelimeter
- c. Pyranometer with shading ring
- d. Pyrhelimeter with shading ring

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 12 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Solar azimuth angle is:

- a. The angle between the sun ray and the zenith
- b. The angle between the sun ray and due South
- c. The angle between the projection of the sun ray on the horizontal plane and the zenith
- d. The angle between the projection of the sun ray on the horizontal plane and due South

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 13 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Stagnation temperature is when absorbed solar energy is equal to the:

- a. Radiative heat loss
- b. Convective heat loss
- c. Conductive heat loss
- d. Total heat loss

Options :

1. A
2. B
3. C
4. D

Question Number : 14 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A central receiver CSP plant may include:

- a. A cavity receiver
- b. A cylindrical receiver
- c. A volumetric receiver
- d. Any of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 15 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

An evacuated tube collector is suitable for an operating temperature around:

- a. 100 °C
- b. 200 °C
- c. 300 °C
- d. 400 °C

Options :

1. A
2. B
3. C
4. D

Question Number : 16 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Thermal energy storage concept where the storage medium does not circulate is:

- a. Active
- b. Passive
- c. Either (a) or (b) depending on receiver type
- d. None of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 17 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Thermochemical energy storage works using:

- a. Irreversible chemical reactions
- b. Reversible chemical reactions
- c. Absorption cooling
- d. Supercritical heat addition in receiver

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 18 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A model

- a. can only be physical
- b. can only be mathematical
- c. can be physical or mathematical
- d. can be physical, descriptive, or mathematical

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 19 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For optimization, degree of freedom must be

- a. complex number
- b. negative
- c. zero
- d. positive

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 20 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

To determine the variation of power production from a photovoltaic cell on a particular day is

- a. a modelling activity
- b. a simulation activity
- c. a design activity
- d. an optimization activity

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 21 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which one of the following is not a benefit of optimization?

- a. Reduced costs
- b. Lengthened audits
- c. Increased throughput
- d. Increased profit

Options :

- 1. A
- 2. B
- 3. C

4. D

Question Number : 22 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Solution of a mathematical model is known as

- a. Maximization
- b. Analysis
- c. Simulation
- d. Optimization

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 23 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pinch technology is not directly applied to

- a. Hydrogen management
- b. Water management
- c. Plant safety
- d. Emission targeting

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 24 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Overlap of the composite curves represents

- a. the minimum amount of cooling required
- b. the minimum amount of heating required
- c. the minimum process-to-process heat transfer possible
- d. the maximum process-to-process heat transfer possible

Options :

- 1. A
- 2. B

3. C

4. D

Question Number : 25 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For the minimum energy target, which of the following statements is correct?

- a. Transfer heat across the pinch
- b. Use cold utility above the pinch
- c. Do not transfer heat across the pinch
- d. Use hot utility below the pinch

Options :

1. A

2. B

3. C

4. D

Question Number : 26 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The temperature-heat duty profiles of the individual cold streams are combined to obtain

- a. Cold utility requirement
- b. Cold composite curve
- c. Hot utility requirement
- d. Hot composite curve

Options :

1. A

2. B

3. C

4. D

Question Number : 27 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

According to Pinch Analysis, a heat engine should be placed

- a. above the pinch
- b. below the pinch
- c. across the pinch
- d. either above or below the pinch

Options :

1. A

2. B

3. C

4. D

Question Number : 28 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $E^0 = 1.006 \text{ V}$ at 700°C , what is the open circuit voltage (Nernst potential) for an SOFC operating at 700°C (1 bar pressure) on 50% H_2 (balance H_2O) and air?

- a. 1.161 V
- b. 1.230 V
- c. 0.973 V
- d. 0.996 V

Options :

1. A

2. B

3. C

4. D

Question Number : 29 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A 100 cell SOFC stack produces 45 A. The average cell potential is 0.85 V. What is the approximate power output of this stack?

- a. 3.1 kW
- b. 3.8 kW
- c. 4.2 kW
- d. 2.5 kW

Options :

1. A

2. B

3. C

4. D

Question Number : 30 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Now consider that the above stack is fed with gaseous CH₄ at a flow rate of 8 g/min and three times the stoichiometric air required. What is the overall efficiency if efficiency is defined as $\varepsilon = \text{electrical output}/(-\Delta h \text{ of oxidation of fuel in inlet})$? Use the data in the table below.

I	h_i in J/mole	s_i in J/(mole.K)
CH ₄	3.8e4	246
H ₂	2.0e4	165
O ₂	2.2e4	243
H ₂ O	-2.2e5	232
CO ₂	-3.6e5	268
CO	-9.0e4	234

Table: Thermodynamic data at 700 °C

- a. 49%
- b. 52%
- c. 57%
- d. 60%

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 31 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the properties below is undesirable for the material used in PEMFC bipolar plates?

- a. Should be impermeable to liquids
- b. High electrical conductivity
- c. Should allow easy distribution of fuel and air to the electrodes
- d. Should allow gas transport across the bipolar plate

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 32 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the properties below is undesirable for a PEMFC electrolyte?

- a. High ionic conductivity
- b. Low electronic resistivity
- c. Should be impermeable to gases
- d. Should allow liquid water transport across the electrolyte

Options :

1. A
2. B
3. C
4. D

Question Number : 33 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statements is true?

- a. Capacity factor of solar PV is similar to capacity factor of nuclear.
- b. Solar PV can be used as a cost-effective base load plant.
- c. The capacity factor of solar and wind is lower than the capacity factor of coal based thermal generation.
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 34 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Moderator is a material which _____.

- a. Produces lots of neutrons
- b. Absorbs lots of neutron
- c. Increases energy of neutrons
- d. Slows down the neutrons

Options :

1. A
2. B
3. C
4. D

Question Number : 35 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When a critical assembly of fissile material is divided into two parts, it will _____.

- become subcritical
- become supercritical
- remain critical
- depends upon the original mass of the assembly

Options :

- A
- B
- C
- D

Question Number : 36 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A critical reactor of spherical shape is converted into a cubical shape while keeping the mass and volume same. The cubical shaped reactor is _____.

- subcritical because the leakage of neutrons increases
- supercritical because the leakage of neutrons decreases
- criticality is not affected although leakage increases
- criticality is not affected although leakage decreases

Options :

- A
- B
- C
- D

Question Number : 37 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the right statement from the following.

- Enriched uranium has lower percentage of U-235 than natural uranium
- Enriched uranium has higher percentage of U-235 than natural uranium
- Enriched uranium has same percentage of U-235 as natural uranium
- Enrichment is not dependent on percentage of U-235 but its fission rate

Options :

- A
- B
- C
- D

Question Number : 38 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The liquid metal cooled fast breeder reactors require significantly higher level of enrichment due to _____.

- a. lack of moderator in these reactors
- b. effects on the fission rate of uranium by liquid metal
- c. the fact that the breeding reduces the fissile material in the reactor
- d. to enhance the breeding

Options :

1. A
2. B
3. C
4. D

Question Number : 39 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a boiler or furnace resistance temperature detector (RTD) are used for measuring temperatures lower than 150 °C. This is because:

- a. Thermocouples are not accurate in this range.
- b. This statement is incorrect Thermocouples are preferred for this range.
- c. RTDs can withstand corrosive environments
- d. RTDs are cheaper than thermocouples and show linearity in this range.

Options :

1. A
2. B
3. C
4. D

Question Number : 40 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A furnace has a stream of preheated air at 110°C. The air flow rate is 3.6 T/h. The specific heat capacity of air is 1 kJ/kgK (Take reference temperature at 25°C). What is the energy input/second with the air stream?

- a. 170 kW
- b. 85 kW
- c. 170 MW
- d. 85 MW

Options :

1. A
2. B
3. C
4. D

Question Number : 41 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the PAT scheme for industries, which of the following is true?

- a. All industries have the same annual energy saving target
- b. All industries have the same percentage energy reduction target
- c. The percentage saving target for each industry is different and depends on how efficient the industry is currently.
- d. The most efficient industry does not have any energy saving target.

Options :

1. A
2. B
3. C
4. D

Question Number : 42 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A non-contact temperature measurement device is used

- a. because it is cheaper than thermocouples
- b. because it is more accurate than contact devices
- c. because of reasons in both a and b
- d. none of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 43 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In an energy audit,

- a. all technically viable measures must be recommended for installation
- b. only measures that can be installed without investments should be recommended
- c. Energy conservation options must be recommended based on techno-economic viability
- d. None of the above

Options :

1. A
2. B
3. C

4. D

Question Number : 44 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What are the main pipeline design strategies to ensure flow assurance in the crude oil pipeline?

- a. uninsulated flowline
- b. insulated flowline
- c. flowline with active heating
- d. Both (b) and (c)

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 45 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What are the main steps involved in the pipeline blockage by gas hydrate?

- a. water entrainment in oil phase
- b. hydrate shell growth
- c. agglomeration of hydrate shell
- d. all of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 46 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is true?

- A. Coal, Crude Oil, Nuclear Energy and Biomass energy are all sources of primary energy.
- B. Solar Energy and Wind Energy are sources of primary energy.
- C. Hydrogen Energy is a source of primary energy.
 - a. All statements A, B and C are true.
 - b. Only A and C are true.
 - c. Only A and B are true.
 - d. Only B and C are true.

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 47 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The trend of world population versus time for the last two thousand years would show:

- a. Exponential growth similar to the population growth
- b. Exponential growth with a growth rate less than the population growth
- c. Monotonic growth that initially followed the population growth but a reversal of growth seen after 1970's
- d. Exponential growth with a growth rate higher than the population growth

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 48 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the Kaya identity what are the units for the carbon intensity of the energy sector?

- a. tonnes of CO₂/capita
- b. tonnes of CO₂/\$ of GDP
- c. tonnes of CO₂
- d. tonnes of CO₂/MJ

Options :

1. A
2. B
3. C
4. D

Question Number : 49 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which factors affect Human Development Index?

- a. Life Expectancy
- b. Education
- c. Income per capita
- d. All of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 50 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

An increase in the electricity consumption per capita will

- a. Always improve the Human development index (HDI)
- b. Always decrease the HDI
- c. Not affect the HDI
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 51 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The d-spacing for Al at 19.2° (θ , the Bragg angle) using $\text{CuK}\alpha$ radiation ($\lambda = 1.54 \text{ \AA}$).

- 1.54 \AA
- 1.54 nm
- 2.34 \AA
- 2.34 nm

Options :

1. A
2. B
3. C
4. D

Question Number : 52 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Gross selection rule for rotational spectrum is

- molecule should have dipole moment
- molecule should not have dipole moment
- molecule should be polarizable
- None of the above.

Options :

1. A
2. B
3. C
4. D

Question Number : 53 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$0 \rightarrow 1$ transition in IR spectrum is known as

- Absorption
- Emission
- Overtone
- Fundamental transition

Options :

1. A
2. B
3. C
4. D

Question Number : 54 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In XPS spectrum, Intensity is plotted vs.

- a. Wavelength
- b. wave number
- c. frequency
- d. energy of electron

Options :

1. A
2. B
3. C
4. D

Question Number : 55 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Number of electrons involved in an Auger process is

- a. 1
- b. 2
- c. 3
- d. 4

Options :

1. A
2. B
3. C
4. D

Question Number : 56 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Water flows through a circular tube with a volumetric flow-rate Q . If the tube diameter is doubled, the ratio of the Reynolds numbers is _____.

- a. 1
- b. 0.5
- c. 0.25
- d. 2

Options :

1. A
2. B
3. C
4. D

Question Number : 57 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $x \ll 1$, the first order approximation of the function $1/(1-x)$ is _____.

- a. 1
- b. $1-x$
- c. $1+x$
- d. none of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 58 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the temperature profile through a planar insulating wall is expressed as $T(x) = ax + b$, the thermal conductivity of the insulating wall is

- a. directly proportional to temperature
- b. decreases with increase in temperature
- c. independent of temperature
- d. varies quadratically with temperature

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 59 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Drag coefficient for a spherical particle settling in a viscous fluid ($Re_p \ll 1$) is ____.

- a. $1/Re_p$
- b. $24/Re_p$
- c. $36/Re_p$
- d. none of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 60 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Prandtl number of air at normal pressure and temperature is _____.

- a. 0.7
- b. 7.0
- c. 10
- d. 0.07

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 61 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The measurement of a thermodynamic property known as temperature is based on:

- a. First law of thermodynamics
- b. Second law of thermodynamics
- c. Kelvin–Planck statement
- d. Zeroth law of thermodynamics

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 62 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Heat Transfer in liquid and gases is dominated by _____.

- a. conduction
- b. convection
- c. radiation
- d. both conduction and convection

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 63 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the thickness of the material through which heat is conducted is increased by a factor of 2, then the rate of heat transfer:

- a. Increases by factor of 4
- b. decreases by a factor of 4
- c. increases by a factor of 2
- d. decreases by a factor of 2

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 64 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The emf induced in the dc generator armature winding is

- a. AC
- b. DC
- c. AC and DC
- d. none of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 65 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The tunnelling probability of a massive quantum particle

- a. Increases with barrier height
- b. Decreases with increasing barrier strength
- c. Increases with barrier width
- d. Is independent of barrier strength

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 66 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statements best describe the potential variation in an electric double layer?

- a. The potential varies linearly throughout the double layer
- b. The potential varies linearly up to a few Å only and thereafter drops exponentially to an imaginary boundary of double layer
- c. The potential drops exponentially throughout the electrical double layer
- d. There is no potential variation across the double layer

Options :

1. A
2. B
3. C
4. D

Question Number : 67 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is true regarding limitation of Nernst equation?

- a. The Nernst equation should not be used to determine the potential in case of very low concentration of potential determining ions
- b. One should use activity of ions instead of concentration at high concentration of potential determining ions
- c. The Nernst equation is applicable only when there is no net current flow across an electrode
- d. All of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 68 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The current in a metal at any frequency is due to

- a. Conduction current
- b. Displacement current
- c. Both conduction and displacement current
- d. Neither conduction nor displacement current

Options :

1. A
2. B
3. C
4. D

Question Number : 69 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The coal having the highest calorific value is _____.

- a. Anthracite
- b. Lignite
- c. Bituminous
- d. Sub-bituminous

Options :

1. A
2. B
3. C
4. D

Question Number : 70 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Coking coal is used for _____.

- a. Steam production
- b. Coal char production
- c. Coke production
- d. Chemical synthesis

Options :

1. A
2. B
3. C
4. D

Question Number : 71 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The value of solar constant is _____.

- a. 140 W/m^2
- b. 1.4 W/m^2
- c. 1.4 kW/m^2
- d. 1.4 MW/m^2

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 72 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The Act which has been enacted the open access to generate electricity is _____.

- a. Indian Electricity Act 2003
- b. Energy Conservation Act 2001
- c. Indian Electricity Act 2010
- d. Energy Conservation Act 2007

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 73 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following gives the degree of inequality?

- a. Per capita consumption
- b. Energy intensity co-efficient
- c. Gini co-efficient
- d. Least cost of energy

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 74 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following hypothesis is true with respect to 'energy ladder'?

- a. As the income increases, consumer moves from polluting energy resources to non-polluting ones
- b. As the income increases, consumer moves from lower consumption to higher consumption of the same resource
- c. As the income increases, consumer moves from coal based electricity to solar based electricity
- d. All of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 75 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which among the following was the major policy reforms in the energy sector in India during 1990-91?

- a. Electricity Act
- b. Open access of generation
- c. Open access of energy consumption
- d. Unbundling of state electricity boards

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 76 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Anaerobic Digestion is a _____ process.

- a. biochemical
- b. thermochemical
- c. thermal
- d. chemical

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 77 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Proteins are converted to amino acids in the _____ step during biomethanation.

- a. Acidogenesis
- b. Acetogenesis
- c. Hydrolysis
- d. Methanogenesis

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 78 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Plastic pyrolysis occurs in the _____.

- a. presence of air, as per stoichiometric need
- b. absence of air
- c. presence of air, but below the stoichiometric need
- d. presence of excess air

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 79 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The process with the lowest operating temperature is _____.

- a. Combustion
- b. Incineration
- c. Gasification
- d. Pyrolysis

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 80 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

CFLs and Ni-Cd rechargeable batteries are examples of _____.

- a. organic waste
- b. inorganic waste
- c. hazardous waste
- d. inert materials in waste

Options :

1. A
2. B
3. C
4. D

Question Number : 81 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Wind is considered as an intermittent source of energy. Is hydropower considered the same?

- a. No, hydropower is not intermittent source.
- b. Yes, hydropower is intermittent source.
- c. It depends on the type of hydropower generation.
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 82 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A 5 MW Type 3 DFIG-based WTG is connected to grid. Cut in, nominal and cut out wind speeds are 4 m/s, 11 m/s and 23 m/s respectively. Using simple approximation, if the wind speed is 12 m/s, how much active power does the WTG generate?

- a. 5.4545 MW
- b. 6.491 MW
- c. 5.95 MW
- d. None of the above

Options :

1. A
2. B
3. C

4. D

Question Number : 83 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following type wave energy converter captures wave energy from all the directions?

- a. Point absorber
- b. Oscillating wave surge converter
- c. Oscillating water column
- d. Attenuator

Options :

1. A
2. B
3. C
4. D

Question Number : 84 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A pycnocline is the layer where the _____ is greatest within a body of ocean water.

- a. salinity gradient
- b. temperature gradient
- c. density gradient
- d. turbidity gradient

Options :

1. A
2. B
3. C
4. D

Question Number : 85 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

_____ is a by-product of biodiesel production.

- a. Glycerol
- b. Ethanol
- c. Methanol
- d. Lignin

Options :

1. A
2. B
3. C

4. D

Question Number : 86 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

2nd generation ethanol production needs _____ as the feed stock.

- a. corn starch
- b. lignocellulosic biomass
- c. both the above
- d. none of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 87 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The reactive power sharing does not depend on which of these parameters?

- a. Line impedances
- b. Load locations
- c. m-p droop slope
- d. Q-V droop slope

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 88 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which amongst the following controllers will react first to the voltage set point change?

- a. Primary control
- b. Secondary control
- c. Tertiary control
- d. PWM control

Options :

- 1. A
- 2. B
- 3. C

4. D

Question Number : 89 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is a passive islanding detection technique:

- a. Impedance method
- b. State estimator based detection
- c. Active frequency drift
- d. Sandia voltage drift

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 90 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The ratings of three generators are in the ratio of 1:2:4. The P- ω droop slopes for these generators should be set in the ratio of:

- a. 1:1:1
- b. 1:2:4
- c. 4:2:1
- d. None of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 91 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of these tests assesses the performance of a DR/DSM program from the perspective of utility?

- a. Total resource cost test
- b. Rate payer impact measurement test
- c. Participation cost test
- d. Societal cost test

Options :

- 1. A
- 2. B
- 3. C

4. D

Question Number : 92 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a cause for rate limiting while H₂ sorption?

- a. Nucleation
- b. Dissociation of H₂ molecule
- c. Diffusion
- d. None of the above

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 93 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The targeted onboard percent efficiency of hydrogen storage system is _____.

- a. 80%
- b. 85 %
- c. 90%
- d. 95 %

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 94 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The mode of hydrogen transport preferred for large volumes and longer distance is _____.

- a. Tube trailer
- b. Liquid hydrogen by insulated vessels
- c. Pipelines
- d. By Trucks

Options :

- 1. A
- 2. B
- 3. C
- 4. D

Question Number : 95 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The investment required to lay down a hydrogen dedicated pipeline is:

- a. Higher than CNG pipeline
- b. Equal to that for CNG pipeline
- c. Lower than CNG pipeline
- d. None of the above

Options :

1. A
2. B
3. C
4. D

Question Number : 96 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What would be the impact on solar PV module output voltage if the module temperature increases?

- a. Voltage increase if temperature coefficient for voltage of the cell is positive
- b. Voltage decrease if temperature coefficient for voltage of the cell is positive
- c. Voltage increase if temperature coefficient for voltage of the cell is negative
- d. No change

Options :

1. A
2. B
3. C
4. D

Question Number : 97 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

To get 3.5 volts from a PV module, which of the following cell combination would you consider if each cell generates 0.6 volts at maximum power?

- a. 3 cells in series and 3 cells in parallel
- b. 6 cells in parallel
- c. 6 cells in series
- d. None of these

Options :

1. A

2. B
3. C
4. D

Question Number : 98 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Main factor which guides the choice of material for making solar cells is

- a. Material manufacturing cost
- b. Material availability
- c. Material non-toxicity
- d. All the above

Options :

1. A
2. B
3. C
4. D

Question Number : 99 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which type of material is most widely used for making solar cells?

- a. Semiconductor
- b. Insulator
- c. Metal
- d. None of these

Options :

1. A
2. B
3. C
4. D

Question Number : 100 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Solar passive architecture harnesses natural forces for heat and mass transfer. It includes processes for:

- a. Distribution
- b. Control
- c. Storage and collection
- d. All of these

Options :

1. A
2. B

3. C

4. D