ADVITIYA ACADEMY OF LEARNING

KARNATAKA DCET 2023

Question Paper & Detailed Solutions

Complete 100 MCQs with Step-by-Step Derivations

Comprehensive solved question paper with authentic official KEA key answers, diagrams, mathematical explanations, and syllabus categorization.

Total Questions: 100 | **Sections:** 5 | **Duration:** 3 Hours

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Prepared by **Advitiya Academy Of Learning**

Validated against Official KEA Key Answers

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Section 1: Engineering Mathematics

Q1 – Q20

Q.1 ENGINEERING MATHEMATICS

In a square matrix, if the elements above the principal diagonal are zero, then it is called:

(1) Identity matrix

(2) ✓ Lower triangular matrix

(3) Upper triangular matrix

(4) Diagonal matrix

✓ Answer: Option (2)

SOLUTION

Explanation: A square matrix is lower triangular if all entries above the main diagonal are zero.

Step-by-step:

1. Recall the definition of triangular matrices.
2. A matrix A is lower triangular if $a_{ij} = 0$ for all $i < j$.
3. This means that all elements above the principal diagonal are zero, e.g., $A = \begin{pmatrix} 2 & 0 & 0 \\ 1 & 4 & 0 \\ 2 & 5 & 1 \end{pmatrix}$.

Q.2 ENGINEERING MATHEMATICS

The value of x if $\begin{vmatrix} x-1 & 2 \\ 2 & 4 \end{vmatrix}$ is singular, is:

(1) 3

(2) 8

(3) -2

(4) ✓ 2

✓ Answer: Option (4)

SOLUTION

Explanation: A matrix is singular if its determinant is equal to zero.

Step-by-step:

1. Set the determinant of the matrix to 0:

$$\begin{vmatrix} x-1 & 2 \\ 2 & 4 \end{vmatrix} = 0$$

2. Expand the determinant:

$$(x-1)(4) - (2)(2) = 0$$

$$4x - 4 - 4 = 0$$

$$4x - 8 = 0$$

$$4x = 8 \implies x = 2.$$

Q.3 ENGINEERING MATHEMATICS

The inverse of the matrix $A = \begin{pmatrix} -1 & 0 \\ 5 & 7 \end{pmatrix}$ is:

(1) ✓ $-\frac{1}{7}\begin{pmatrix} 7 & 0 \\ -5 & -1 \end{pmatrix}$

(2) $\frac{1}{7}\begin{pmatrix} 7 & 0 \\ -5 & -1 \end{pmatrix}$

(3) $-\frac{1}{7}\begin{pmatrix} -7 & 0 \\ -5 & -1 \end{pmatrix}$

(4) $\frac{1}{7}\begin{pmatrix} 7 & 0 \\ 5 & 1 \end{pmatrix}$

✓ Answer: Option (1)

SOLUTION

Explanation: The inverse of a 2×2 matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is given by $A^{-1} = \frac{1}{|A|}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$.

Step-by-step:

1. Find the determinant of A:
$|A| = (-1)(7) - (0)(5) = -7$.
2. Find the adjoint of A (swap diagonal elements, negate off-diagonal elements):
$\text{adj } A = \begin{pmatrix} 7 & 0 \\ -5 & -1 \end{pmatrix}$.
3. Calculate the inverse:
$A^{-1} = \frac{1}{|A|}\text{adj } A = \frac{1}{-7}\begin{pmatrix} 7 & 0 \\ -5 & -1 \end{pmatrix} = -\frac{1}{7}\begin{pmatrix} 7 & 0 \\ -5 & -1 \end{pmatrix}$.

Q.4 ENGINEERING MATHEMATICS

The eigenvalue of the matrix $A = \begin{pmatrix} 3 & 0 \\ 1 & 3 \end{pmatrix}$ is:

(1) $2, 2$

(2) $-3, -3$

(3) ✓ $3, 3$

(4) $-3, 3$

✓ Answer: Option (3)

SOLUTION

Explanation: For a triangular matrix, the eigenvalues are simply the diagonal entries.

Step-by-step:

1. The matrix $A = \begin{pmatrix} 3 & 0 \\ 1 & 3 \end{pmatrix}$ is a lower triangular matrix because the upper off-diagonal element is 0.
2. In any triangular (upper or lower) or diagonal matrix, the eigenvalues are equal to the diagonal entries.
3. The diagonal entries of A are 3 and 3.
4. Therefore, the eigenvalues are $3, 3$.

Q.5 ENGINEERING MATHEMATICS

The two lines $ax + by = c$ and $a'x + b'y = c'$ are perpendicular if:

(1) $ab' = ba'$

(2) ✓ $aa' + bb' = 0$

(3) $a'b + a'b' = 0$

(4) $ab' + ba' = 0$

✓ Answer: Option (2)

SOLUTION

Explanation: Two straight lines are perpendicular if the product of their slopes is -1 ($m_1 \cdot m_2 = -1$).

Step-by-step:

1. Find the slope of the first line $ax + by = c \implies y = -\frac{a}{b}x + \frac{c}{b}$. Slope $m_1 = -\frac{a}{b}$.
2. Find the slope of the second line $a'x + b'y = c' \implies y = -\frac{a'}{b'}x + \frac{c'}{b'}$. Slope $m_2 = -\frac{a'}{b'}$.
3. Apply perpendicularity condition: $m_1 \cdot m_2 = -1 \implies \left(-\frac{a}{b}\right)\left(-\frac{a'}{b'}\right) = -1$.
4. Simplify: $\frac{aa'}{bb'} = -1 \implies aa' = -bb' \implies aa' + bb' = 0$.

Q.6 ENGINEERING MATHEMATICS

The y-intercept of any line passing through the origin is:

(1) ✓ 0

(2) 1

(3) -1

(4) 2

✓ Answer: Option (1)

SOLUTION

Explanation: A line passing through the origin has coordinates $(0, 0)$ satisfying its equation.

Step-by-step:

1. The general equation of a straight line in slope-intercept form is $y = mx + c$, where c is the y-intercept.
2. Since the line passes through the origin $(0, 0)$, substitute $x = 0$ and $y = 0$ into the equation: $0 = m(0) + c \implies c = 0$.
3. Therefore, the y-intercept is always 0.

Q.7 ENGINEERING MATHEMATICS

Slope intercept form of straight line is:

(1) $y + mx - c = 0$

(2) $x = my + c$

(3) $y = x + m$

(4) ✓ $y = mx + c$

✓ Answer: Option (4)

SOLUTION

Explanation: The standard slope-intercept form of a straight line is represented with slope m and intercept c.

Step-by-step:

1. Recall the standard forms of straight line equations.
2. The slope-intercept form expresses the dependent variable y in terms of the independent variable x, scaling factor (slope) m, and vertical offset (intercept) c.
3. The equation is $y = mx + c$.

Q.8 ENGINEERING MATHEMATICS

The tangent of the angle of intersection between two lines with slopes m_1 and m_2 is:

(1) $\left|\frac{m_1+m_2}{1-m_1m_2}\right|$

(2) $\left|\frac{m_1+m_2}{m_1-m_2}\right|$

(3) $\left|\frac{m_1-m_2}{1-m_1m_2}\right|$

(4) ✓ $\left|\frac{m_1-m_2}{1+m_1m_2}\right|$

✓ Answer: Option (4)

SOLUTION

Explanation: The angle of intersection θ is derived from the tangent subtraction formula $\tan(\theta_1 - \theta_2)$.

Step-by-step:

1. Let the two lines have inclinations θ_1 and θ_2. The angle between them is $\theta = \theta_1 - \theta_2$.
2. Apply the tangent identity: $\tan\theta = \tan(\theta_1 - \theta_2) = \frac{\tan\theta_1 - \tan\theta_2}{1+\tan\theta_1\tan\theta_2}$.
3. Since $m_1 = \tan\theta_1$ and $m_2 = \tan\theta_2$, we have $\tan\theta = \frac{m_1-m_2}{1+m_1m_2}$.
4. To get the acute angle, take the absolute value: $\tan\theta = \left|\frac{m_1-m_2}{1+m_1m_2}\right|$.

Q.9 ENGINEERING MATHEMATICS

If a ladder is inclined to the wall at an angle of 135^\circ, then the inclination in radians is:

(1) $\frac{4\pi}{3}$

(2) ✓ $\frac{3\pi}{4}$

(3) $\frac{2\pi}{4}$

(4) $\frac{4\pi}{5}$

✓ Answer: Option (2)

SOLUTION

Explanation: Convert degrees to radians using the formula:
$\text{Angle in Radians} = \text{Angle in Degrees} \times \frac{\pi}{180}$.

Step-by-step:

1. Given angle: $\theta = 135^\circ$.
2. Apply the conversion formula:
$\theta_{\text{rad}} = 135 \times \frac{\pi}{180}$.
3. Simplify the fraction by dividing numerator and denominator by 45:
$\theta_{\text{rad}} = \frac{135}{45} \times \frac{\pi}{180/45} = \frac{3\pi}{4}$.

Q.10 ENGINEERING MATHEMATICS

The value of $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$ is:

(1) ✓ $\frac{1}{2}$

(2) $-\frac{1}{2}$

(3) $\frac{\sqrt{3}}{2}$

(4) 0

✓ Answer: Option (1)

SOLUTION

Explanation: Solve using standard values or the sine difference identity: $\sin(A-B) = \sin A \cos B - \cos A \sin B$.

Step-by-step:

1. Method 1 (Trigonometric identity):

Identify the expression as $\sin(A-B)$ where $A = 60^\circ$ and $B = 30^\circ$.

$\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ = \sin(60^\circ - 30^\circ) = \sin 30^\circ = \frac{1}{2}$.

2. Method 2 (Direct substitution):

Substitute standard values:

$\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\cos 60^\circ = \frac{1}{2}$, $\sin 30^\circ = \frac{1}{2}$.

Expression $= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$.

Q.11 ENGINEERING MATHEMATICS

The simplified value of $\frac{\sin 3A+\sin A}{\sin 3A-\sin A}$ is:

(1) $\cot A \tan 5A$

(2) $\tan A \cot 2A$

(3) ✓ $\tan 2A \cot A$

(4) $\tan 3A \cot 2A$

✓ Answer: Option (3)

SOLUTION

Explanation: Apply the sum-to-product trigonometric identities: $\sin C + \sin D = 2\sin\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$ $\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$.

Step-by-step:

1. Expand the numerator $\sin 3A + \sin A$ using sum-to-product identity:
$= 2\sin\left(\frac{3A+A}{2}\right)\cos\left(\frac{3A-A}{2}\right) = 2\sin 2A \cos A.$
2. Expand the denominator $\sin 3A - \sin A$ using sum-to-product identity:
$= 2\cos\left(\frac{3A+A}{2}\right)\sin\left(\frac{3A-A}{2}\right) = 2\cos 2A \sin A.$
3. Set up the fraction:
$\frac{2\sin 2A \cos A}{2\cos 2A \sin A} = \left(\frac{\sin 2A}{\cos 2A}\right)\left(\frac{\cos A}{\sin A}\right) = \tan 2A \cot A.$

Q.12 ENGINEERING MATHEMATICS

If $y = \log x + \sec 2x$, then $\frac{dy}{dx}$ is:

(1) $-\frac{1}{x} + \sec 2x \tan x$

(2) ✓ $\frac{1}{x} + 2\sec 2x \tan 2x$

(3) $\frac{1}{\sqrt{x}} + \sec x \tan x$

(4) $-\frac{1}{\sqrt{x}} + \sec 3x \tan 2x$

✓ Answer: Option (2)

SOLUTION

Explanation: Differentiate term by term using the derivative of $\log x$ and the chain rule for $\sec 2x$.

Step-by-step:

1. Differentiate the first term $\log x$:
$\frac{d}{dx}(\log x) = \frac{1}{x}$.
2. Differentiate the second term $\sec 2x$ using the chain rule:
$\frac{d}{dx}(\sec 2x) = \sec 2x \tan 2x \cdot \frac{d}{dx}(2x) = 2\sec 2x \tan 2x$.
3. Add the terms: $\frac{dy}{dx} = \frac{1}{x} + 2\sec 2x \tan 2x$.

Q.13 ENGINEERING MATHEMATICS

The derivative of the function $\frac{1+x}{1-x}$ is:

(1) $\frac{-2}{(1-x)^2}$

(2) $\frac{2x}{(1-x)^2}$

(3) $\frac{-2x}{(1-x)^2}$

(4) ✓ $\frac{2}{(1-x)^2}$

✓ Answer: Option (4)

SOLUTION

Explanation: Use the Quotient Rule of differentiation: $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{u'v - uv'}{v^2}$.

Step-by-step:

1. Let $u = 1 + x \implies u' = 1$.
2. Let $v = 1 - x \implies v' = -1$.
3. Apply the quotient rule:
$\frac{dy}{dx} = \frac{(1)(1-x) - (1+x)(-1)}{(1-x)^2}$
$= \frac{1-x+1+x}{(1-x)^2} = \frac{2}{(1-x)^2}$.

Q.14 ENGINEERING MATHEMATICS

Find the second order derivative of $y = e^{2x} - e^{-x}$:

(1) ✓ $4e^{2x} - e^{-x}$

(2) $4e^{2x} + e^{-x}$

(3) $-4e^{2x} - e^{-x}$

(4) $4e^{2x} + e^{x}$

✓ Answer: Option (1)

SOLUTION

Explanation: Calculate the first derivative, then differentiate it again using the chain rule.

Step-by-step:

1. Find the first derivative $\frac{dy}{dx}$:
$\frac{dy}{dx} = \frac{d}{dx}(e^{2x}) - \frac{d}{dx}(e^{-x}) = 2e^{2x} - (-e^{-x}) = 2e^{2x} + e^{-x}$.
2. Find the second derivative $\frac{d^2y}{dx^2}$:
$\frac{d^2y}{dx^2} = \frac{d}{dx}(2e^{2x} + e^{-x}) = 4e^{2x} + (-e^{-x}) = 4e^{2x} - e^{-x}$.

Q.15 ENGINEERING MATHEMATICS

The equation of the tangent to the curve $y = 2x^2 + x$ at $(1, 2)$ is:

(1) ✓ $5x - y - 3 = 0$

(2) $5x + y + 3 = 0$

(3) $5x - y - 6 = 0$

(4) $5x + y + 6 = 0$

✓ Answer: Option (1)

SOLUTION

Explanation: Find the slope of the tangent at the given point by differentiating the curve, then use the point-slope form.

Step-by-step:

1. Differentiate the curve to find the general slope expression:
$\frac{dy}{dx} = \frac{d}{dx}(2x^2 + x) = 4x + 1.$
2. Evaluate the slope m at the point $(1, 2)$:
$m = 4(1) + 1 = 5.$
3. Use the point-slope form $y - y_1 = m(x - x_1)$:
$y - 2 = 5(x - 1)$
$y - 2 = 5x - 5$
$5x - y - 3 = 0.$

Q.16 ENGINEERING MATHEMATICS

The value of $\int(\sec x \tan x + \sec^2 x)\, dx$ is:

(1) $\sec 2x + \tan x + C$

(2) $\sec x + \csc x + C$

(3) ✓ $\sec x + \tan x + C$

(4) $\sec 2x - \csc^2 x + C$

✓ Answer: Option (3)

SOLUTION

Explanation: Integrate term by term using fundamental integration formulas.

Step-by-step:

1. Split the integral into two parts:
$\int \sec x \tan x\, dx + \int \sec^2 x\, dx.$
2. Apply fundamental integrals:
$\int \sec x \tan x\, dx = \sec x$
$\int \sec^2 x\, dx = \tan x.$
3. Combine and add constant of integration C:
$= \sec x + \tan x + C.$

Q.17 ENGINEERING MATHEMATICS

The value of $\int (2x^3 + 3x^2 + 2x)^{10}(3x^2 + 3x + 1)\,dx$ is:

(1) $\frac{1}{22}(6x + 3x^2 + 2x)^{11} + C$

(2) ✓ $\frac{1}{22}(2x^3 + 3x^2 + 2x)^{11} + C$

(3) $\frac{1}{22}(2x^3 + 3x^2 - 2x)^{12} + C$

(4) $\frac{1}{12}(2x^3 + 3x^2 - 2x)^{12} + C$

✓ Answer: Option (2)

SOLUTION

Explanation: Solve using integration by substitution: let $u = 2x^3 + 3x^2 + 2x$.

Step-by-step:

1. Let $u = 2x^3 + 3x^2 + 2x$.
2. Differentiate with respect to x:

$$du = (6x^2 + 6x + 2)\,dx = 2(3x^2 + 3x + 1)\,dx \implies \frac{du}{2} = (3x^2 + 3x + 1)\,dx.$$

3. Substitute into the integral:

$$\int u^{10}\frac{du}{2} = \frac{1}{2}\int u^{10}\,du = \frac{1}{2}\cdot\frac{u^{11}}{11} + C = \frac{u^{11}}{22} + C.$$

4. Substitute back for u:

$$= \frac{1}{22}(2x^3 + 3x^2 + 2x)^{11} + C.$$

Q.18 ENGINEERING MATHEMATICS

The value of $\int_0^{\pi/4} \tan^2 x \, dx$ is:

(1) $1 + \frac{\pi}{4}$

(2) $1 + \frac{4\pi}{2}$

(3) ✓ $1 - \frac{\pi}{4}$

(4) $1 - \frac{4\pi}{2}$

✓ Answer: Option (3)

SOLUTION

Explanation: Convert using the trigonometric identity $\tan^2 x = \sec^2 x - 1$ before integrating.

Step-by-step:

1. Rewrite the integral:
$\int_0^{\pi/4} (\sec^2 x - 1) \, dx.$
2. Integrate term by term:
$= [\tan x - x]_0^{\pi/4}.$
3. Substitute the upper limit $\pi/4$:
$(\tan(\pi/4) - \pi/4) = 1 - \pi/4.$
4. Substitute the lower limit 0:
$(\tan(0) - 0) = 0.$
5. Subtract: $(1 - \pi/4) - 0 = 1 - \pi/4.$

Q.19 ENGINEERING MATHEMATICS

The area bounded by $y = \sin x$ and x-axis from $x = 0$ to $x = \pi$ is:

(1) ✓ 2

(2) -2

(3) 3

(4) 1

✓ Answer: Option (1)

📝 SOLUTION

Explanation: Find the area under the curve using definite integration: $A = \int_a^b y\,dx$.

Step-by-step:

1. Set up the integral with the given limits:
$A = \int_0^{\pi} \sin x\,dx$.
2. Integrate $\sin x$:
$A = [-\cos x]_0^{\pi}$.
3. Substitute the limits:
$A = (-\cos \pi) - (-\cos 0) = (-(-1)) - (-1) = 1 + 1 = 2$.

Q.20 ENGINEERING MATHEMATICS

The value of $\tan 45^\circ \cot 225^\circ + \tan^2 60^\circ$ is:

(1) -4

(2) ✓ 4

(3) 2

(4) 3

✓ Answer: Option (2)

📝 SOLUTION

Explanation: Evaluate each trigonometric term and calculate the sum.

Step-by-step:

1. Find the value of $\tan 45^\circ$:
$\tan 45^\circ = 1$.
2. Find the value of $\cot 225^\circ$:
$\cot 225^\circ = \cot(180^\circ + 45^\circ) = \cot 45^\circ = 1$ (positive in third quadrant).
3. Find the value of $\tan 60^\circ$:
$\tan 60^\circ = \sqrt{3} \implies \tan^2 60^\circ = (\sqrt{3})^2 = 3$.
4. Substitute and evaluate:
$(1 \times 1) + 3 = 1 + 3 = 4$.

Section 2: Statistics & Analytics

Q21 – Q40

Q.21 STATISTICS & ANALYTICS

_____ is an example of quantitative data.

(1) ✓ Volume

(2) Words

(3) Symbols

(4) Colour

✓ Answer: Option (1)

📝 SOLUTION

Explanation: The data which can be numerically measurable is called quantitative data. 'Volume' is measured in numbers. ∴ Volume is quantitative data.

> **Step-by-step:**
> The data which can be numerically measurable is called quantitative data. "Volume" measured in numbers. Volume is a quantitative data

Q.22 STATISTICS & ANALYTICS

Data cleaning in the process of

(1) ✓ removing viruses

(2) correctly formatting data

(3) removing duplicate data

(4) properly formatting data

✓ Answer: Option (1)

SOLUTION

Explanation: Data cleaning is the process offixing (or) removing incorrect, corrupted, incorrectly formatted, duplicate (or) incomplete data with in a dataset.

> **Step-by-step:**
> Data cleaning is the process offixing (or) removing incorrect, corrupted, incorrectly formatted, duplicate (or) incomplete data with in a dataset.

Q.23 STATISTICS & ANALYTICS

is not a data collection tool.

(1) ✓ Word

(2) Focus Group Discussion

(3) Survey

(4) Questionnaires 14

✓ Answer: Option (1)

SOLUTION

Explanation: The data collection tools focus group discussion, survey method, questionnaires, observation, Interview method. Word is not a data collection tool

> **Step-by-step:**
> The data collection tools focus group discussion, survey method, questionnaires, observation, Interview method. Word is not a data collection tool

Q.24 STATISTICS & ANALYTICS

The graph of cumulative frequency is called

(1) ✓ Frequency polygon

(2) Histogram

(3) Cumulative frequency polygon

(4) Frequency histogram

✓ Answer: Option (1)

SOLUTION

Explanation: The cumulative frequencies can be plotted only on cumulative frequency polygon (or) cumulative frequency curve (O give curve)

Step-by-step:
The cumulative frequencies can be plotted only on cumulative frequency polygon (or) cumulative frequency curve (O give curve)

Q.25 STATISTICS & ANALYTICS

To calculate percentage frequency, we use formula.

(1) ✓ P.E = (fx n) + 100

(2) n) x 100

(3) P.f. = (100) + (fx n) Ans : (b &

(4) Percentage frequency = x 100 n

✓ Answer: Option (1)

SOLUTION

Explanation: The official KEA key answer is Option (1).

Step-by-step:
The official KEA key answer is Option (1).

Q.26 STATISTICS & ANALYTICS

If 7M, X2, X X are the observations of a given data, then the mean of the observation will be : Total number of observations

(1) Sum of observations

(2) Sum of observations + Total number of observations Sum of observations

(3) ✓ Total number of observations

(4) Total number of observations observations Sum of

✓ Answer: Option (3)

SOLUTION

Explanation: Mean ofthe observations is or n or n Sum of observations Total number of observations

Step-by-step:
Mean ofthe observations is or n or n Sum of observations Total number of observations

Q.27 STATISTICS & ANALYTICS

The end points ofa class interval are the values that a variable can take. and

(1) ✓ Lowest and Highest

(2) Minimum and Maximum

(3) Numeral and Average

(4) Mean and Mode

✓ Answer: Option (1)

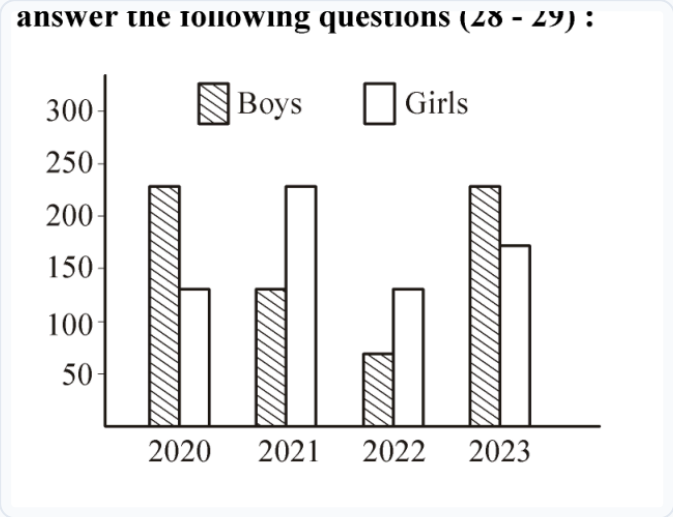
SOLUTION

Explanation: If [10 - 20] is a class interval and the end points of the class interval are IO and 20, which are the lowest and highest values in the variable. The graph given below, shows the participating of students of a school in outdoor games in different years. By using the data given below, answer the following questions (28 - 29) : 300 O Girls 250 200 150 100 50 2020 2021 2022 2023

Step-by-step:
If [10 - 20] is a class interval and the end points of the class interval are IO and 20, which are the lowest and highest values in the variable. The graph given below, shows the participating of students of a school in outdoor games in different years. By using the data given below, answer the following questions (28 - 29) : 300 O Girls 250 200 150 100 50 2020 2021 2022 2023

Q.28 STATISTICS & ANALYTICS

The graph given below shows the participation of students of a school in outdoor games in different years.



In which years did the girls participate more than the boys?

(1) 2020, 2023

(2) ✓ 2021, 2022

(3) 2022, 2023

(4) 2020, 2021

✓ Answer: Option (2)

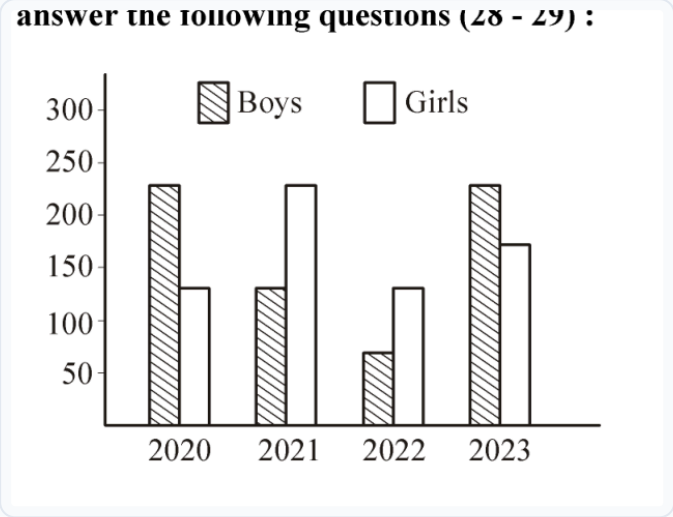
📝 SOLUTION

Explanation: In 2021: Girls = 150, Boys = 125 (Girls > Boys). In 2022: Girls = 125, Boys = 50 (Girls > Boys). Therefore, in 2021 and 2022 girls participated more than boys.

> **Step-by-step:**
> 1. Year 2020: Boys = 225, Girls = 175 (Boys > Girls)
> 2. Year 2021: Boys = 125, Girls = 150 (Girls > Boys)
> 3. Year 2022: Boys = 50, Girls = 125 (Girls > Boys)
> 4. Year 2023: Boys = 225, Girls = 200 (Boys > Girls)
> Conclusion: In 2021 and 2022, girls participation exceeded boys.

Q.29 STATISTICS & ANALYTICS

Based on the outdoor games graph given above:



In which two years did an equal number of boys participate?

(1) 2020, 2021

(2) 2020, 2022

(3) ✓ 2020, 2023

(4) 2021, 2022

✓ Answer: Option (3)

SOLUTION

Explanation: In both 2020 and 2023, the number of boys participating was exactly equal to 225.

Step-by-step:

1. Boys participation in 2020 = 225.
2. Boys participation in 2023 = 225.
3. Therefore, an equal number of boys participated in 2020 and 2023.

Q.30 STATISTICS & ANALYTICS

To find third quartile in Excel, we use formula.

(1) = QUARTER (3, Range)

(2) = QUARTILE (3, Range)

(3) -QUARTER (Range, 3)

(4) ✓ = QUARTILE (Range, 3)

✓ Answer: Option (4)

SOLUTION

Explanation: The formula for finding 3rd quartile in excel is QUARTILE (Range, 3)

Step-by-step:

The formula for finding 3rd quartile in excel is QUARTILE (Range, 3)

Q.31 STATISTICS & ANALYTICS

The percentile divides a series into _____ equal parts.

(1) fifty

(2) twenty

(3) ten

(4) ✓ hundred

✓ Answer: Option (4)

SOLUTION

Explanation: Data which divides into 100 equal parts is called percentile. It is denoted by P.

Step-by-step:

P

Q.32 STATISTICS & ANALYTICS

The value of first quartile is 23 and interquartile of set of data range is 20. The value of third quartile is

(1) 23

(2) 33

(3) ✓ 43

(4) 53 15

✓ Answer: Option (3)

SOLUTION

Explanation: Given, 1st quartile QI 23 Inter quartile range Q3 - Q -20 (1) From equation (1) q -QI = 20 q -23 = 20 =20+23 (23

Step-by-step:
Given, 1st quartile QI 23 Inter quartile range Q3 - Q -20 (1) From equation (1) q -QI = 20 q -23 = 20 =20+23 (23

Q.33 STATISTICS & ANALYTICS

The algebraic sum of the deviations of a frequency distribution from its mean is always

(1) a non-zero number

(2) ✓ zero

(3) less than zero

(4) greater than zero

✓ Answer: Option (2)

SOLUTION

Explanation: The property of arithmetic mean is The algebraic sum ofthe deviations ofa frequency distribution from its mean is equal to zero. E(x-X) i.e.,

Step-by-step:
The property of arithmetic mean is The algebraic sum ofthe deviations ofa frequency distribution from its mean is equal to zero. E(x-X) i.e.,

Q.34 STATISTICS & ANALYTICS

The Excel formula for 'Mean' is

(1) = MEDIAN (array of numbers)

(2) ✓ =AVERAGE (array ofnumbers)

(3) = MEAN (array of numbers)

(4) = MODE (array ofnumbers)

✓ Answer: Option (2)

SOLUTION

Explanation: The Excel formula for "mean" is AVERAGE (array ofnumbers)

Step-by-step:

The Excel formula for "mean" is AVERAGE (array ofnumbers)

Q.35 STATISTICS & ANALYTICS

What is output syntax in Python?

(1) Print (" ")

(2) PRINT (" ")

(3) ✓ print (" ")

(4) Printf (" ")

✓ Answer: Option (3)

SOLUTION

Explanation: In Python, the print(" ") statement is used for output.

Step-by-step:

b) PRINT (d) Printf(" in python print (" ") statement is used for output

Q.36 STATISTICS & ANALYTICS

"str" is a

(1) ✓ Text Type

(2) Numeric Type

(3) Binary Type

(4) Sequence Type

✓ Answer: Option (1)

SOLUTION

Explanation: str is text Type 16

Step-by-step:

str is text Type 16

Q.37 STATISTICS & ANALYTICS

In Python, _____ standard data types are commonly used.

(1) three

(2) ✓ five

(3) ten

(4) four

✓ Answer: Option (2)

SOLUTION

Explanation: In Python, standard data types are numeric, Dictionary, Boolean, Set, and Sequence types.

Step-by-step:

standard data types are b) five d) four in python standard data types are numeric, Dictionary, Boolean, Set, Sequence types

Q.38 STATISTICS & ANALYTICS

The result of Python program gets displayed in

(1) ✓ IDLE Shell 3.9.1 window

(2) IDLE Shell 3.1.9 window

(3) ILDEShell 3.9.1 window

(4) IELDShell 3.9.1 window

✓ Answer: Option (1)

SOLUTION

Explanation: IDLE3.9.1 is the first version of Python it is Integrated Development and Learning Environment.

Step-by-step:

IDLE3.9.1 is the first version of Python it is Integrated Development and Learning Environment.

Q.39 STATISTICS & ANALYTICS

Which one of the following quotations in Python does not accept the quotes to denote strings?

(1) (' ')

(2) (" ")

(3) ✓ (/ /)

(4) (''' ''')

✓ Answer: Option (3)

SOLUTION

Explanation: In Python, string literals can be enclosed in single quotes (' '), double quotes (" "), or triple quotes (''' '''). Forward slashes (//) are used for integer division or comments in other languages, not string quotes.

Step-by-step:

in python its accept single quote double quote and triple quote.

Q.40 STATISTICS & ANALYTICS

In Python, _____ is used to end the physical line or ignore the comment.

(1) **

(2) ✓ #

(3) &

(4) \

✓ Answer: Option (2)

SOLUTION

Explanation: In Python, the # character is used to start a comment. The comment continues after the # until the end of the line.

> **Step-by-step:**
> In Python, the # character is used to start a comment. The comment continues after the # until the end of the line.

Section 3: IT Skills

Q41 – Q60

Q.41 IT SKILLS

Which of the following is NOT a cyber crime?

(1) ✓ Cryptography

(2) Denial of Service

(3) Man-in-the-middle attack

(4) Phishing

✓ Answer: Option (1)

📝 SOLUTION

Explanation: Cryptography is an encryption and security method used to safeguard data, not a cybercrime.

Step-by-step:

1. Denial of Service (DoS), Man-in-the-middle (MitM), and Phishing are malicious cyber attacks.
2. Cryptography is a defensive mechanism used for confidential and secure communication.

Q.42 IT SKILLS

DoS is abbreviated as

(1) ✓ Denial of Service

(2) Distribution ofServer

(3) Distribution of Service

(4) Denial of Server

✓ Answer: Option (1)

SOLUTION

Explanation: DOS Expansion is denial-of-service. 43. protects interconnected systems including hardware, software and programs and data from cyber attacks. Cyber Security Computer Security Resource Security Hardware Security Ans : (CYBER SECURITY is a protection of interconnected systems including hardware software and program and data from cyber-attack.

> **Step-by-step:**
> DOS Expansion is denial-of-service. 43. protects interconnected systems including hardware, software and programs and data from cyber attacks. Cyber Security Computer Security Resource Security Hardware Security Ans : (CYBER SECURITY is a protection of interconnected systems including hardware software and program and data from cyber-attack.

Q.43 IT SKILLS

_____ protects interconnected systems including hardware, software and programs and data from cyber attacks.

(1) ✓ Cyber Security

(2) Computer Security

(3) Resource Security

(4) Hardware Security

✓ Answer: Option (1)

SOLUTION

Explanation: Cyber Security is the protection of interconnected systems including hardware, software, programs, and data from cyber attacks.

> **Step-by-step:**
> The official KEA key answer is Option (1).

Q.44 IT SKILLS

Basic functionality of the network device firewall is :

(1) scans mobile applications

(2) monitoring database

(3) privatizes the computers

(4) ✓ monitoring incoming and outgoing networks

✓ Answer: Option (4)

SOLUTION

Explanation: A firewall is a network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules

> **Step-by-step:**
> A firewall is a network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules

Q.45 IT SKILLS

An algorithm represented in the form of programming language is called :

(1) Flowchart

(2) Pseudocode

(3) ✓ Program

(4) Instruction

✓ Answer: Option (3)

SOLUTION

Explanation: An algorithm represented in the form of a programming language is called a program.

> **Step-by-step:**
> Paper & Solutions

Q.46 IT SKILLS

The symbol is used when the flowchart is starting or ending.

(1) Connector/Arrow

(2) ✓ Terminal box/Rounded rectangle

(3) Input/Output

(4) Process

✓ Answer: Option (2)

SOLUTION

Explanation: in flow chart "Terminator Symbol," this symbol represents the stan points, end points, and potential outcomes ofa path

> **Step-by-step:**
> in flow chart "Terminator Symbol," this symbol represents the stan points, end points, and potential outcomes ofa path

Q.47 IT SKILLS

MIT App Inventor allows user to

(1) Create web application

(2) ✓ Build Android application

(3) Create System Software

(4) Develop Operating System

✓ Answer: Option (2)

SOLUTION

Explanation: MIT app inventor allows user tobuild fully functional apps for smartphones and tablets:

> **Step-by-step:**
> MIT app inventor allows user tobuild fully functional apps for smartphones and tablets:

Q.48 IT SKILLS

What is the function of the "when green flag clicked" command block?

(1) Points Sprite in the specified direction

(2) Ifcondition is true, runs the blocks inside

(3) ✓ Runs the script

(4) Stops the execution ofscript

✓ Answer: Option (3)

SOLUTION

Explanation: Runs the script: - when green flag clicked block triggers the execution of the script or program attached to it.

> **Step-by-step:**
> Runs the script: - when green flag clicked block triggers the execution of the script or program attached to it.

Q.49 IT SKILLS

The correct sequence of HTML tags for starting a webpage is

(1) Head, Title, Html, Body

(2) ✓ Html, Head, Title, Body

(3) Html, Body, Title, Head

(4) Html, Title, Head, Body

✓ Answer: Option (2)

SOLUTION

Explanation: The correct sequence of HTML tags to start a webpage is html, head, title, and body.

> **Step-by-step:**
> The correct sequence of HTML tags to start a webpage is html, head, title, and body.

Q.50 IT SKILLS

Web server :

(1) ✓ is a computer system that delivers web pages

(2) is delivery news

(3) provides options for those seeking real-time discussions

(4) prints documents

✓ Answer: Option (1)

SOLUTION

Explanation: A web server stores and delivers the content for a website

Step-by-step:
A web server stores and delivers the content for a website

Q.51 IT SKILLS

Which of the following is used to style the appearance of web pages?

(1) Html

(2) JavaScript

(3) PHP

(4) ✓ CSS

✓ Answer: Option (4)

SOLUTION

Explanation: CSS is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes

Step-by-step:
CSS is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes

Q.52 IT SKILLS

Which of the following is an example of web browser?

(1) Google

(2) ✓ Firefox

(3) Apache

(4) MySQL

✓ Answer: Option (2)

SOLUTION

Explanation: Firefox is an open-source web browser. Google is a search engine/company, Apache is a web server, and MySQL is a relational database management system.

> **Step-by-step:**
> Fire fox is example ofweb browser

Q.53 IT SKILLS

Which of the following is an open source and free workflow management software?

(1) ✓ Trello

(2) MS Excel

(3) Windows

(4) Linux

✓ Answer: Option (1)

SOLUTION

Explanation: Trello is a visual workflow and project management tool that empowers teams to manage tasks and projects.

> **Step-by-step:**
> Trello is the visual tool that empowers your team to manage any type of project, workflow or task tracking.

Q.54 IT SKILLS

ERP package will handle functionality/functionalities. business

(1) One

(2) Two

(3) Three

(4) ✓ Multiple/all

✓ Answer: Option (4)

SOLUTION

Explanation: ERP systems supports all aspects ofmodules and provide transparency into complete business process. 18

> **Step-by-step:**
> ERP systems supports all aspects ofmodules and provide transparency into complete business process. 18

Q.55 IT SKILLS

is a visual diagram of a company that describes what employees do, whom they report to and how decisions are made across the business.

(1) Physical Structure

(2) ✓ Organizational Structure

(3) Logical Structure

(4) Hybrid Structure

✓ Answer: Option (2)

SOLUTION

Explanation: Organisational structure describes entire structure oforganisation and work structure ofemployees.

> **Step-by-step:**
> Organisational structure describes entire structure oforganisation and work structure ofemployees.

Q.56 IT SKILLS

_____ is a methodology used in system analysis to identify, clarify, and organize system requirements.

(1) ✓ Workflow

(2) Use case

(3) Algorithm

(4) Software

✓ Answer: Option (1)

SOLUTION

Explanation: Workflow helps in identifying, clarifying, and organizing system requirements.

Step-by-step:

Workflow helps in identifying, clarify requirements of organise system.

Q.57 IT SKILLS

Which of the following is not an application of IoT?

(1) ✓ Web browser

(2) Smart home

(3) Smart city

(4) Self-driven cars

✓ Answer: Option (1)

SOLUTION

Explanation: Smart homes, smart cities, and self-driving cars are standard IoT applications. A web browser is an application software used to access the World Wide Web, not an IoT physical device application.

Step-by-step:

IoT but web browser is not a application ofIoT.

Q.58 IT SKILLS

Which of the following is not a cloud service option ?

(1) ✓ Vaas

(2) IaaS

(3) PaaS

(4) SaaS

✓ Answer: Option (1)

SOLUTION

Explanation: PAAS, SAAS,IAAS all three is cloud services but VAAS(Voice as a service) is not cloud service

Step-by-step:

PAAS, SAAS,IAAS all three is cloud services but VAAS(Voice as a service) is not cloud service

Q.59 IT SKILLS

How many types of services are offered by cloud computing to the users?

(1) 2

(2) 4

(3) ✓ 3

(4) 5

✓ Answer: Option (3)

SOLUTION

Explanation: Three primary service models are offered by cloud computing: IaaS (Infrastructure as a Service), PaaS (Platform as a Service), and SaaS (Software as a Service).

Step-by-step:

PAAS, SAAS,IAAS services offered by cloud services.

Q.60 IT SKILLS

Combination of Public and Private deployment is called

(1) ✓ Hybrid

(2) Hyper

(3) Public

(4) Private

✓ Answer: Option (1)

📝 SOLUTION

Explanation: A hybrid cloud refers to a mixed computing, storage, and services environment combining on-premises/private infrastructure and public cloud services.

> **Step-by-step:**
> Hybrid cloud refers to a mixed computing, storage, and services environment made up ofon-premises infrastructure, private cloud services, and a public cloud-such as Amazon Web Services (AWS) or Microsoft Azure-with orchestration among the various platforms

Section 4: Fundamentals of Electrical & Electronics Engineering

Q61 – Q80

Q.61 FEEE

Unit of electrical power is

(1) Volt

(2) ✓ Watt

(3) Watt-hour

(4) Ampere-hour

✓ Answer: Option (2)

📝 SOLUTION

Explanation: A Watt (W) is the SI unit of electrical power. 1 Watt = 1 Joule per second = 1 Volt × 1 Ampere.

> **Step-by-step:**
> A of current when operated at a potential difference of

Q.62 FEEE

In pipe earthing, the diameter of GI pipe embedded in the pit is

(1) 32 mm

(2) ✓ 38 mm

(3) 48 mm

(4) 56 mm

✓ Answer: Option (2)

📝 SOLUTION

Explanation: As per Indian Standard electrical earthing codes, GI pipe electrodes used for earthing shall not be smaller than 38 mm internal diameter.

> **Step-by-step:**
> Pipe electrodes shall not be smaller than 38 mm internal diameter ifmade of galvanized iron or steel, and 100 mm internal diameter ifmade ofcast iron.

Q.63 FEEE

If a resistor of 100 ohms is connected in series with a parallel combination of two 200 ohms resistors, then the effective resistance is:

(1) ✓ 200 ohms

(2) 250 ohms

(3) 350 ohms

(4) 150 ohms

✓ Answer: Option (1)

SOLUTION

Explanation: The two 200 Ω resistors in parallel have an equivalent resistance of 100 Ω. In series with the 100 Ω resistor, total resistance is 100 + 100 = 200 Ω.

Step-by-step:

1. Parallel combination: $R_p = \frac{200 \times 200}{200+200} = \frac{40000}{400} = 100\,\Omega$.
2. Total equivalent resistance: $R_{eq} = R_1 + R_p = 100 + 100 = 200\,\Omega$.

Q.64 FEEE

If a resistor of 20 Ω is connected across a source of 5 volts DC supply, then the current in the circuit is:

(1) 1 Ampere

(2) 4 Amperes

(3) 0.5 Amperes

(4) ✓ 0.25 Amperes

✓ Answer: Option (4)

SOLUTION

Explanation: According to Ohm's law, $I = \frac{V}{R} = \frac{5}{20} = 0.25\ \text{A}$.

Step-by-step:

1. Given voltage $V = 5\ \text{V}$, resistance $R = 20\,\Omega$.
2. Ohm's Law: $I = \frac{V}{R} = \frac{5}{20} = 0.25\ \text{Amperes}$.

Q.65 FEEE

Power factor is

(1) ratio ofresistance to inductance 5 20

(2) ratio of apparent power to true power

(3) ✓ ratio ofresistance to impedance

(4) ratio of inductance to capacitance

✓ Answer: Option (3)

SOLUTION

Explanation: In AC circuits, the power factor is defined as the ratio ofthe resistance (R) to impedance (Z) in the circuit. Where (P is the angle between voltage and current. Ifthe current lags the voltage, the power factor will be lagging. If the current leads the voltage, the power factor will be leading.

> **Step-by-step:**
> In AC circuits, the power factor is defined as the ratio ofthe resistance (R) to impedance (Z) in the circuit. Where (P is the angle between voltage and current. Ifthe current lags the voltage, the power factor will be lagging. If the current leads the voltage, the power factor will be leading.

Q.66 FEEE

The phase-to-neutral voltage in a 3-phase star connected system is 230 V. The phase-to- phase (line-to-line) voltage is

(1) 230 v

(2) ✓ 398.37 v

(3) 400 v

(4) 440 V 19

✓ Answer: Option (2)

SOLUTION

Explanation: The phase-to-phase (line-to-line) voltage is given by, where Vph 230 V x vph.= *230=398.37 V

> **Step-by-step:**
> The phase-to-phase (line-to-line) voltage is given by, where Vph 230 V x vph.= *230=398.37 V

Q.67 FEEE

The time period of an AC wave at frequency of 50 Hz is

(1) 2 milliseconds

(2) 10 milliseconds

(3) ✓ 20 milliseconds

(4) 50 milliseconds

✓ Answer: Option (3)

SOLUTION

Explanation: Time period T = 1 / f = 1 / 50 Hz = 0.02 seconds = 20 milliseconds.

> **Step-by-step:**
> Time period ofa wave is given by frequency 1 = 0.02 s 50 Since the options is in milliseconds 0.02*1000 20milliseconds.

Q.68 FEEE

The type of fuse used for domestic purpose is

(1) HRCfuse

(2) ✓ Kit kat or rewirable fuse

(3) Ceramic cartridge fuse

(4) Glass cartridge fuse

✓ Answer: Option (2)

SOLUTION

Explanation: Purpose offuse in household circuit: It safeguards the circuit and the appliances connected in the circuit from being damaged. It also protects the appliences from the current that over exceeds the specified value due to voltage fluctuation, short circuit.

> **Step-by-step:**
> Purpose offuse in household circuit: It safeguards the circuit and the appliances connected in the circuit from being damaged. It also protects the appliences from the current that over exceeds the specified value due to voltage fluctuation, short circuit.

Q.69 FEEE

MCCB stands for

(1) ✓ Molded Case Circuit Breaker

(2) Miniature Case Circuit Breaker

(3) Maximum Current Circuit Breaker

(4) Minimum Current Circuit Breaker

✓ Answer: Option (1)

SOLUTION

Explanation: MCCB stands for Molded Case Circuit Breaker

> **Step-by-step:**
> MCCB stands for Molded Case Circuit Breaker

Q.70 FEEE

ELCB is used for detecting current leakage

(1) ✓ above 8 kVA

(2) below 5 kVA

(3) above 5 kVA

(4) below 8 kVA

✓ Answer: Option (1)

📝 SOLUTION

Explanation: An Earth Leakage Circuit Breaker (ELCB / RCCB) is an electrical safety device designed to detect earth leakage current to prevent fatal electric shocks and electrical fires. In technical practice, an ELCB detects residual fault currents measured in milliamperes (typically 30 mA for human safety, and 100 mA to 300 mA for equipment and fire protection). However, under Indian Electricity Rules (Rule 61A) and CEIG electrical installation regulations, earth leakage protective devices are mandatorily installed for power installations with connected loads exceeding 5 kW / 5 kVA (and high-capacity commercial/industrial installations above 8 kVA). Because the question framed leakage detection in units of apparent power (kVA) rather than leakage current (mA), KEA officially awarded Grace Marks in the final answer key (while Option 1 was indicated in the provisional key).

> **Step-by-step:**
> 1. **Function of ELCB**: An Earth Leakage Circuit Breaker (ELCB) monitors the circuit for unwanted current escaping to ground/earth through an accidental path or human body contact.
> 2. **Leakage Current Rating vs Installation Load**: Technically, an ELCB trips based on leakage current in milliamperes (30 mA – 300 mA). However, electrical installation standards specify mandatory ELCB/RCCB installation based on total connected capacity (typically for installations exceeding 5 kVA / 8 kVA).
> 3. **Provisional vs Final KEA Key**: Option (1) ('above 8 kVA') was the initial provisional key answer for large supply installations. Due to the unit phrasing ambiguity (kVA vs mA), KEA awarded **Grace Marks** in the official final answer key.

Q.71 FEEE

A static machine which transfers electrical power from one circuit to another circuit without changing the frequency is called

(1) DC machine

(2) Alternator

(3) Induction motor

(4) ✓ Transformer

✓ Answer: Option (4)

SOLUTION

Explanation: Since it is designed to either increase or decrease AC voltage between the circuits while maintaining the same frequency of the current.

> **Step-by-step:**
> Since it is designed to either increase or decrease AC voltage between the circuits while maintaining the same frequency of the current.

Q.72 FEEE

The initial type of connection of the motor windings when started with a star delta starter is

(1) ✓ star connection

(2) delta connection

(3) series

(4) parallel

✓ Answer: Option (1)

SOLUTION

Explanation: During starting, the stator windings are connected in star configuration, which reduces starting voltage across each phase to 1/√3 (about 58%) and limits heavy starting current.

> **Step-by-step:**
> d) parallel During starting the stator winding is star connected, which provides less starting torque and puts less mechanical and electrical stress on the system, thereby increasing its lifespan.

Q.73 FEEE

The cause for a 3-phase motor producing inadvertent mechanical noise is :

(1) Interchanged supply terminals

(2) High load on motor

(3) High voltage on motor winding

(4) ✓ Incorrect coupling

✓ Answer: Option (4)

SOLUTION

Explanation: Ifthe coupling is not aligned perfectly, it can cause excessive wear on the parts and eventually lead to failure. Other causes ofcoupling failure include poor installation, incorrect size, and material issues. Pump coupling failure can have a significant impact on the operation ofa facility.

> **Step-by-step:**
> Ifthe coupling is not aligned perfectly, it can cause excessive wear on the parts and eventually lead to failure. Other causes ofcoupling failure include poor installation, incorrect size, and material issues. Pump coupling failure can have a significant impact on the operation ofa facility.

Q.74 FEEE

Cell is an device

(1) electro-mechanical

(2) ✓ electro-chemical

(3) electro-magnetic

(4) electro-dynamic

✓ Answer: Option (2)

SOLUTION

Explanation: An electrochemical cell is a device that can generate electrical energy from the chemical reactions occurring in it, or use the electrical energy supplied to it to facilitate chemical reactions in it. These devices are capable of converting chemical energy into electrical energy, or vice versa.

> **Step-by-step:**
> An electrochemical cell is a device that can generate electrical energy from the chemical reactions occurring in it, or use the electrical energy supplied to it to facilitate chemical reactions in it. These devices are capable of converting chemical energy into electrical energy, or vice versa.

Q.75 FEEE

The most commonly used battery in electric vehicles is

(1) ✓ Lithium-ion battery

(2) Lead-acid battery

(3) Nickel-Cadmium battery

(4) Alkaline rechargeable battery

✓ Answer: Option (1)

SOLUTION

Explanation: Lithium-ion batteries power the lives ofmillions of people every day. From laptops and cell phones to hybrids and electric cars, this technology is growing in popularity due to its light weight, high energy density, low self-discharge, no memory effect, may offer longer life and ability to recharge.

> **Step-by-step:**
> Lithium-ion batteries power the lives ofmillions of people every day. From laptops and cell phones to hybrids and electric cars, this technology is growing in popularity due to its light weight, high energy density, low self-discharge, no memory effect, may offer longer life and ability to recharge.

Q.76 FEEE

Digital signals are characterized by

(1) Continuous voltage levels

(2) Infinite resolution

(3) ✓ Discrete voltage levels

(4) Variable voltage levels

✓ Answer: Option (3)

SOLUTION

Explanation: A digital signal can only take on one value from a finite set ofpossible values ata given time. With digital signals, the physical quantity representing the information can be many things: Variable electric current or voltage.

> **Step-by-step:**
> A digital signal can only take on one value from a finite set ofpossible values ata given time. With digital signals, the physical quantity representing the information can be many things: Variable electric current or voltage.

Q.77 FEEE

According to rules and laws of Boolean Algebra, A + A = _____

(1) 2A

(2) ✓ A

(3) 1

(4) A^2

✓ Answer: Option (2)

SOLUTION

Explanation: By Idempotent Law of Boolean Algebra: A + A = A, and A · A = A.

Step-by-step:

When both the inputs are the same, applying either an AND gate or OR gate will result in an output equal to the input.

Q.78 FEEE

Photo diode is used in which of the following applications ?

(1) Voltage regulation

(2) Temperature measurement

(3) ✓ Light detection

(4) Radio Frequency (RF)Amplification

✓ Answer: Option (3)

SOLUTION

Explanation: This effect of the proportional change in photocurrent with the change in light intensity can be easily observed by applying a reverse bias. Since photodiodes generate current flow directly depending upon the light intensity received, they can be used as photodetectors to detect optical signals.

Step-by-step:

This effect of the proportional change in photocurrent with the change in light intensity can be easily observed by applying a reverse bias. Since photodiodes generate current flow directly depending upon the light intensity received, they can be used as photodetectors to detect optical signals.

Q.79 FEEE

If a resistor is having a colour band as first band = Brown, second band = Black and third band = Red, then the resistance value is

(1) ✓ 1 kΩ

(2) 10 kΩ

(3) 100 Ω

(4) 100 kΩ

✓ Answer: Option (1)

SOLUTION

Explanation: According to 4-band resistor color codes: Brown = 1 (1st digit), Black = 0 (2nd digit), Red = 10^2 (multiplier). Resistance = 10×10^2 Ω = 1,000 Ω = 1 kΩ.

> **Step-by-step:**
> According to colour code method each bands will have its own values, i.e., 1st band Brown = 1, 2nd band Black 0, 3rd band is Red (multiplier band) = 100 Multiply all the band values. Then the resistance values is, 100 1000= 1kQ

Q.80 FEEE

The binary equivalent of the decimal number 9 is

(1) ✓ 1001

(2) 1000

(3) 1100

(4) 1010

✓ Answer: Option (1)

SOLUTION

Explanation: Successive division of 9 by 2 gives remainders: 9÷2 = 4 (rem 1), 4÷2 = 2 (rem 0), 2÷2 = 1 (rem 0), 1÷2 = 0 (rem 1). Reading from bottom to top gives 1001_2.

> **Step-by-step:**
> 2 2 2 9 4 2 1 9 = 10012 1 .o

Section 5: Project Management Skills

Q81 – Q100

Q.81 PROJECT MANAGEMENT SKILLS

Project Management is a combination of

(1) ✓ human and non-human resources

(2) only human resources 21

(3) only non-human resources

(4) no resources at all

✓ Answer: Option (1)

SOLUTION

Explanation: Project management involves the coordination and utilization ofboth human resources (such as project managers, team members, stakeholders) and non- human resources (such as tools, equipment, technology, materials, and finances) to achieve project goals and objectives. It is a holistic approach that combines both human and non- human elements to successfully complete a project.

> **Step-by-step:**
> Project management involves the coordination and utilization ofboth human resources (such as project managers, team members, stakeholders) and non- human resources (such as tools, equipment, technology, materials, and finances) to achieve project goals and objectives. It is a holistic approach that combines both human and non- human elements to successfully complete a project.

Q.82 PROJECT MANAGEMENT SKILLS

The consultant who is appointed to carry out the project work is

(1) Compound house consultant

(2) In-house consultant

(3) ✓ Out-house consultant

(4) Bridge consultant

✓ Answer: Option (3)

SOLUTION

Explanation: An outsourced consultant is someone who is hired from outside the organization to provide expertise, guidance, and support for a specific project or task

Step-by-step:
An outsourced consultant is someone who is hired from outside the organization to provide expertise, guidance, and support for a specific project or task

Q.83 PROJECT MANAGEMENT SKILLS

The type of project which requires minimum amount of capital is

(1) Crash project

(2) ✓ Normal project

(3) Disaster project

(4) Consultant project

✓ Answer: Option (2)

SOLUTION

Explanation: Normal projects, will be allowed to take their normal time, minimum capital with no sacrifice in quality.

Step-by-step:
Normal projects, will be allowed to take their normal time, minimum capital with no sacrifice in quality.

Q.84 PROJECT MANAGEMENT SKILLS

Projects like building a hospital, a park, a playground and government projects like highway construction are examples of

(1) ✓ Social needs

(2) Customer needs

(3) Market needs

(4) Ecological needs

✓ Answer: Option (1)

SOLUTION

Explanation: The basic requirements for a society is hospital, park, schools, road construction etc., hence they all are social need projects. 22

Step-by-step:
The basic requirements for a society is hospital, park, schools, road construction etc., hence they all are social need projects. 22

Q.85 PROJECT MANAGEMENT SKILLS

In Project Management, WBS stands for

(1) ✓ Work Breakdown Structure

(2) Waste Breakdown Structure

(3) Window Breakdown Structure

(4) Wireless Breakdown Structure

✓ Answer: Option (1)

SOLUTION

Explanation: WBS full form: Work Breakdown Structure

Step-by-step:
WBS full form: Work Breakdown Structure

Q.86 PROJECT MANAGEMENT SKILLS

The first step in Project Execution Plan is

(1) Work packaging plan

(2) ✓ Contracting plan

(3) Organization plan

(4) Procedure plan

✓ Answer: Option (2)

SOLUTION

Explanation: Under the four sub plans ofProject Execution Plan, the contracting plan will be the first step used in preparation of PEP. To develop self-regulating systems, it is necessary to contract out those areas where the owner companies do not have inherent competence.

> **Step-by-step:**
> Under the four sub plans ofProject Execution Plan, the contracting plan will be the first step used in preparation of PEP. To develop self-regulating systems, it is necessary to contract out those areas where the owner companies do not have inherent competence.

Q.87 PROJECT MANAGEMENT SKILLS

The team which gives the idea to start a project is

(1) Core project team

(2) Full project team

(3) Advising project team

(4) ✓ Initial project team

✓ Answer: Option (4)

SOLUTION

Explanation: The initial project team consists of specific people who initially conceive the idea ofstarting a project.

> **Step-by-step:**
> The initial project team consists of specific people who initially conceive the idea ofstarting a project.

Q.88 PROJECT MANAGEMENT SKILLS

In PEP, the letter 'E' stands for

(1) ✓ Execution

(2) Estimation

(3) Evaluation

(4) Enthusiasm

✓ Answer: Option (1)

SOLUTION

Explanation: PEP stands for Project Execution Plan. Therefore, 'E' stands for Execution.

Step-by-step:

Plan.

Q.89 PROJECT MANAGEMENT SKILLS

In Project Life Cycle, more time is required for

(1) Project closure

(2) Project initiation

(3) ✓ Project execution

(4) Project planning

✓ Answer: Option (3)

SOLUTION

Explanation: Execution phase consumes maximum time to complete work in a project life cycle.

Step-by-step:

Execution phase consumes maximum time to complete work in a project life cycle.

Q.90 PROJECT MANAGEMENT SKILLS

Innovation is the hallmark of every project. Here innovation means

(1) ✓ New ideas

(2) Project success

(3) Professional approach

(4) Project Management

✓ Answer: Option (1)

SOLUTION

Explanation: Innovation is a hallmark of many successful proj ects, and it refers to the process of introducing new ideas, methods, products, services, or approaches that create value and improve upon existing practices.

> **Step-by-step:**
> Innovation is a hallmark of many successful proj ects, and it refers to the process of introducing new ideas, methods, products, services, or approaches that create value and improve upon existing practices.

Q.91 PROJECT MANAGEMENT SKILLS

The Project Life Cycle Curve indicates

(1) Work packaging

(2) Number of workers in the project

(3) ✓ Growth, maturity and decline

(4) Project manual

✓ Answer: Option (3)

SOLUTION

Explanation: Project life cycle curve explains how project is initiated, its growth, its working process, maturity and the completion ofproject.

> **Step-by-step:**
> Project life cycle curve explains how project is initiated, its growth, its working process, maturity and the completion ofproject.

Q.92 PROJECT MANAGEMENT SKILLS

In Project Management, taking actions to measure the quality accurately is the function of

(1) ✓ Quality management

(2) Cost management

(3) Review management

(4) Risk management

✓ Answer: Option (1)

SOLUTION

Explanation: Quality Management is one of the methods to measure quality accurately in Project Management.

> **Step-by-step:**
> Quality Management is one of the methods to measure quality accurately in Project Management.

Q.93 PROJECT MANAGEMENT SKILLS

Project planning methodologies involve

(1) Planning by non-incentive and direction

(2) ✓ Planning by incentive and direction

(3) Unplanned initiation

(4) Changing the project policies DCET - 2023 Question Paper & Solutions

✓ Answer: Option (2)

SOLUTION

Explanation: Planning by Incentive: This could mean that project planning involves creating incentives or rewards to motivate project team members and stakeholders. Planning by Direction: Planning by direction suggests that proj ect planning involves providing clear guidance and direction to the project team.

> **Step-by-step:**
> Planning by Incentive: This could mean that project planning involves creating incentives or rewards to motivate project team members and stakeholders. Planning by Direction: Planning by direction suggests that proj ect planning involves providing clear guidance and direction to the project team.

Q.94 PROJECT MANAGEMENT SKILLS

Identify the incorrect statement below:

(1) Project objective should be specific

(2) Project objective should be realistic

(3) ✓ Project objective should not be framed timely

(4) Project objective should be measurable

✓ Answer: Option (3)

SOLUTION

Explanation: Project objective must be specific measurable and realistic. It cannot be changed timely.

> **Step-by-step:**
> Project objective must be specific measurable and realistic. It cannot be changed timely.

Q.95 PROJECT MANAGEMENT SKILLS

WBS, PEP and PPM are the tools used to design

(1) Project plan

(2) ✓ Project work system

(3) Project diary

(4) Project direction

✓ Answer: Option (2)

SOLUTION

Explanation: Project Work System incorporates Work Breakdown Structure (WBS), Project Execution Plan (PEP), and Project Procedure Manual (PPM).

> **Step-by-step:**
> Structure , Project Execution Plan , Project Procedure Manual.

Q.96 PROJECT MANAGEMENT SKILLS

The earliest method used for planning of project was

(1) CPM

(2) PERT

(3) ✓ Bar Chart

(4) Milestone Chart

✓ Answer: Option (3)

SOLUTION

Explanation: The earliest formal technique developed for project planning and scheduling was the Bar Chart (Gantt Chart), devised around 1910–1915.

> **Step-by-step:**
> Bar chart. 23

Q.97 PROJECT MANAGEMENT SKILLS

The expansion of PERT is

(1) ✓ Programme Evaluation and Review Technique

(2) Project Estimation and Recording Tool

(3) Project Estimation and Resource Technology

(4) Performance Estimation and Resource Tool

✓ Answer: Option (1)

SOLUTION

Explanation: PERT full form Programme Evaluation and Review Technique

> **Step-by-step:**
> PERT full form Programme Evaluation and Review Technique

Q.98 PROJECT MANAGEMENT SKILLS

For non-repetitive projects tool is used in production planning and scheduling.

(1) CPM

(2) ✓ PERT

(3) Both CPMandPERT

(4) Bar Chart

✓ Answer: Option (2)

SOLUTION

Explanation: For non-repetitive projects PERT is the tool used in project planning and scheduling

Step-by-step:

For non-repetitive projects PERT is the tool used in project planning and scheduling

Q.99 PROJECT MANAGEMENT SKILLS

The purpose of conducting a project review is

(1) To close the project

(2) To initiate the project

(3) To develop the project scope

(4) ✓ To assess project performance

✓ Answer: Option (4)

SOLUTION

Explanation: Project review will help in evaluating project performance.

Step-by-step:

Project review will help in evaluating project performance.

Q.100 PROJECT MANAGEMENT SKILLS

A project review does not contain

(1) Performance evaluation

(2) Evaluating the capital budget

(3) ✓ Data collection

(4) Initial review

✓ Answer: Option (3)

📝 SOLUTION

Explanation: Data Collection is not a step of project review; it is an ongoing execution/monitoring activity. The primary steps of project review are assessment, variance analysis, corrective action planning, and documentation.

> **Step-by-step:**
> Project review involves evaluating milestones, assessing progress against baselines, identifying variances, and recommending corrective measures. Data collection precedes review.

Answer Key

Quick Reference – All 100 Questions

Q.No	Ans	Q.No	Ans	Q.No	Ans	Q.No	Ans	Q.No	Ans
1	(2)	21	(1)	41	(1)	61	(2)	81	(1)
2	(4)	22	(1)	42	(1)	62	(2)	82	(3)
3	(1)	23	(1)	43	(1)	63	(1)	83	(2)
4	(3)	24	(1)	44	(4)	64	(4)	84	(1)
5	(2)	25	(1)	45	(3)	65	(3)	85	(1)
6	(1)	26	(3)	46	(2)	66	(2)	86	(2)
7	(4)	27	(1)	47	(2)	67	(3)	87	(4)
8	(4)	28	(2)	48	(3)	68	(2)	88	(1)
9	(2)	29	(3)	49	(2)	69	(1)	89	(3)
10	(1)	30	(4)	50	(1)	70	(1)	90	(1)
11	(3)	31	(4)	51	(4)	71	(4)	91	(3)
12	(2)	32	(3)	52	(2)	72	(1)	92	(1)
13	(4)	33	(2)	53	(1)	73	(4)	93	(2)
14	(1)	34	(2)	54	(4)	74	(2)	94	(3)
15	(1)	35	(3)	55	(2)	75	(1)	95	(2)
16	(3)	36	(1)	56	(1)	76	(3)	96	(3)
17	(2)	37	(2)	57	(1)	77	(2)	97	(1)
18	(3)	38	(1)	58	(1)	78	(3)	98	(2)
19	(1)	39	(3)	59	(3)	79	(1)	99	(4)
20	(2)	40	(2)	60	(1)	80	(1)	100	(3)

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