

ADVITIYA ACADEMY OF LEARNING

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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:** 10 | **Duration:** 3 Hours

Prepared by **Advitiya Academy Of Learning**

Validated against Official KEA Key Answers



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Section 1: Mathematics

Q1 – Q20

Q.1 MATHEMATICS

If A is a square matrix given by $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$, the principal diagonal elements of above matrix are:

(1) 1 2 3

(2) 4 5 6

(3) ✓ 1 5 9

(4) 7 5 3

✓ Answer: Option (3)

SOLUTION

Explanation: It correctly lists the elements located exactly on the main diagonal from top-left to bottom-right.

Step-by-step:

The principal diagonal elements of a square matrix are the elements a_{ij} where the row index i is equal to the column index j . • Identify element a_{11} (Row 1, Column 1): 1 • Identify element a_{22} (Row 2, Column 2): 5 • Identify element a_{33} (Row 3, Column 3): 9 • Final Simplification: 1, 5, 9

Q.2 MATHEMATICS

The value of $\begin{vmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{vmatrix}$ is:

(1) -1

(2) 0

(3) $\checkmark$ 1

(4) 2

✓ Answer: Option (3)

 SOLUTION

Explanation: The expansion of the matrix simplifies into the fundamental trigonometric identity $\cos^2 x + \sin^2 x$, which equals 1.

Step-by-step:

$$\Delta = a_{31}C_{31} + a_{32}C_{32} + a_{33}C_{33}$$

Expand along the 3rd row:

$$\Delta = 0 - 0 + 1 \begin{vmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{vmatrix}$$

$$\Delta = 1 \cdot [(\cos x \cdot \cos x) - (\sin x \cdot -\sin x)]$$

$$\Delta = \cos^2 x - (-\sin^2 x) = \cos^2 x + \sin^2 x$$

$$\Delta = 1$$

Q.3

MATHEMATICS

For any square matrix A , identify the correct statement:

(1) $\checkmark A \cdot \text{adj}(A) = |A| \cdot I$

(2) $A \cdot \text{adj}(A) = 0$

(3) $\text{adj}(A) = |A| \cdot I$

(4) $A \cdot \text{adj}(A) = 1$

✓ Answer: Option (1)

SOLUTION

Explanation: According to the fundamental theorems of matrix algebra, if A is any square matrix, multiplying A by its adjoint matrix always yields a scalar matrix where every element on the principal diagonal is equal to the determinant of A . Mathematically: $A(\text{adj } A) = (\text{adj } A)A = |A|I$.

Step-by-step:

By the fundamental theorem of matrix algebra, multiplying a square matrix by its adjoint matrix results in a scalar matrix.

The diagonal elements of this resulting matrix are equal to the determinant of A (i.e., $|A|$), and all off-diagonal elements are 0.

Therefore, $A \cdot \text{adj}(A) = |A| \cdot I$, where I is the identity matrix.

Q.4 MATHEMATICS

The minors of the elements 5 & 2 in the matrix $A = \begin{pmatrix} 1 & -2 & 4 \\ 5 & 2 & -1 \\ 7 & 6 & 9 \end{pmatrix}$ are:

(1) 24, 52

(2) ✓ -42, -19

(3) -6, 2

(4) 42, 19

✓ Answer: Option (2)

 SOLUTION

Explanation: Step-by-step determinant calculations of the respective 2×2 sub- matrices yield exactly -42 and -19.

Step-by-step:

Minor of 5 (Position a_{21}): Delete Row 2 and Column 1.

$$M_{21} = \begin{vmatrix} -2 & 4 & 6 & 9 \end{vmatrix} = (-2 \times 9) - (4 \times 6) = -18 - 24 = -42$$

Minor of 2 (Position a_{22}): Delete Row 2 and Column 2.

$$M_{22} = \begin{vmatrix} 1 & 4 & 7 & 9 \end{vmatrix} = (1 \times 9) - (4 \times 7) = 9 - 28 = -19$$

Q.5 MATHEMATICS

If $x + y + \lambda = 0$ is an equation of a line passing through the point $(1, 2)$, then the value of λ is:

(1) 3

(2) $\frac{1}{3}$

(3) $\checkmark -3$

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

✓ Answer: Option (3)

 SOLUTION

Explanation: Direct algebraic substitution and transposing the constant yields -3.

Step-by-step:

If a point lies on a given line, substituting its coordinates must satisfy the equation.

$$(1) + (2) + \lambda = 0$$

$$3 + \lambda = 0$$

$$\lambda = -3$$

Q.6 MATHEMATICS

If $4y - 3x - 7 = 0$ is a given equation of a straight line, then its slope is:

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

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

(3) $\checkmark \frac{3}{4}$

(4) $-\frac{3}{4}$

✓ Answer: Option (3)

 SOLUTION

Explanation: Isolating y yields a positive coefficient of $3/4$ for x , which is the slope.

Step-by-step:

Rearrange the equation into slope-intercept form ($y = mx + c$).

$$4y = 3x + 7$$

$$y = \frac{3}{4}x + \frac{7}{4}$$

Identify the value occupying the m position (coefficient of x). $m = \frac{3}{4}$

Q.7 MATHEMATICS

If a straight line is parallel to Y-axis, then its slope is:

(1) 0

(2) ✓ ∞

(3) 1

(4) -1

✓ Answer: Option (2)

 SOLUTION

Explanation: $\tan(90^\circ)$ evaluates to infinity, which perfectly matches the behavior of a vertical line.

Step-by-step:

The slope (m) of a straight line is $m = \tan \theta$. A line parallel to the Y-axis is perfectly vertical ($\theta = 90^\circ$).

$$m = \tan(90^\circ) = \infty$$

Q.8 MATHEMATICS

Equation of a straight line whose angle of inclination with x-axis is 135° and having 4 units as its y-intercept is:

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

(2) $x - y + 4 = 0$

(3) $x + y + 4 = 0$

(4) ✓ $x + y - 4 = 0$

✓ Answer: Option (4)

 SOLUTION

Explanation: Applies the derived slope of -1 and the positive intercept, matching the final algebraic form.

Step-by-step:

Calculate the slope $m = \tan(135^\circ) = \tan(180^\circ - 45^\circ) = -\tan(45^\circ) = -1$. Substitute $m = -1$ and intercept $c = 4$ into $y = mx + c$:

$$y = -1x + 4$$

Rearrange into standard format ($Ax + By + C = 0$):

$$x + y - 4 = 0$$

Q.9 MATHEMATICS

If $y = \frac{2}{1-x}$ then $\frac{dy}{dx}$ is:

(1) 0

(2) ✓ $\frac{2}{(1-x)^2}$

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

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

✓ Answer: Option (2)

 SOLUTION

Explanation: Applying the chain rule correctly results in the double negative canceling out, yielding a positive numerator.

Step-by-step:

Rewrite fraction using negative exponents: $y = 2(1-x)^{-1}$ Apply chain rule:

$$\frac{dy}{dx} = 2 \cdot (-1)(1-x)^{-2} \cdot \frac{d}{dx}(1-x)$$

$$\frac{dy}{dx} = -2(1-x)^{-2} \cdot (-1)$$

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

The derivative of $e^x \cos x$ is:

(1) $e^x(\sin x - \cos x)$

(2) $e^x(-\sin x - \cos x)$

(3) ✓ $e^x(-\sin x + \cos x)$

(4) $-e^x(-\sin x + \cos x)$

✓ Answer: Option (3)

 SOLUTION

Explanation: The expansion perfectly matches the mathematical outcome of applying the product rule.

Step-by-step:

Use Product Rule: $\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$ Let $u = e^x$, $v = \cos x$.

$$\frac{du}{dx} = e^x$$

$$\frac{dv}{dx} = -\sin x$$

$$\frac{dy}{dx} = (e^x)(-\sin x) + (\cos x)(e^x)$$

$$\frac{dy}{dx} = e^x(-\sin x + \cos x)$$

Q.11

MATHEMATICS

If $y = e^{3x} + e^{-5x}$ then $\frac{d^2y}{dx^2}$ at $x = 0$ is:

(1) 35

(2) ✓ 34

(3) 36

(4) -35

✓ Answer: Option (2)

 SOLUTION

Explanation: Applying the chain rule for exponential derivatives twice and substituting $x = 0$ yields exactly 34.

Step-by-step:

First derivative:

$$\frac{dy}{dx} = 3e^{3x} - 5e^{-5x}$$

Second derivative:

$$\frac{d^2y}{dx^2} = 9e^{3x} + 25e^{-5x}$$

Substitute $x = 0$:

$$\frac{d^2y}{dx^2} = 9e^0 + 25e^0 = 9(1) + 25(1) = 34$$

Q.12

MATHEMATICS

Rate of change of area 'A' of a circle with respect to its radius 'r' is:

(1) ✓ $\frac{dA}{dr} = 2\pi r$

(2) $\frac{dA}{dr} = \pi r^2$

(3) $\frac{dA}{dr} = 2\pi$

(4) $\frac{dA}{dr} = \pi r$

✓ Answer: Option (1)

SOLUTION

Explanation: The derivative of the area formula πr^2 directly yields $2\pi r$, geometrically representing the circumference.

Step-by-step:

Area of a circle: $A = \pi r^2$ Differentiate A with respect to r :

$$\frac{dA}{dr} = \pi \cdot \frac{d}{dr}(r^2) = \pi \cdot 2r = 2\pi r$$

Q.13

MATHEMATICS

Match List – I (function) with List – II (integrand) and select the correct answer using the codes given below: List – I: (a) $\int e^x dx$ (b) $\int \frac{1}{x} dx$ (c) $\int dx$ (d) $\int \sec^2 x dx$ List – II: (i) $\log x + c$ (ii) $e^x + c$ (iii) $\tan x + c$ (iv) $x + c$

(1) a – i, b – ii, c – iv, d – iii

(2) a – ii, b – iii, c – i, d – iv

(3) ✓ a – ii, b – i, c – iv, d – iii

(4) a – iv, b – iii, c – ii, d – i

✓ Answer: Option (3)

SOLUTION

Explanation: Matches each function exactly to its universally accepted standard calculus integration formula.

Step-by-step:

• (a) $\int e^x dx = e^x + c \rightarrow$ (ii) • (b) $\int \frac{1}{x} dx = \log x + c \rightarrow$ (i) • (c) $\int dx = x + c \rightarrow$ (iv) • (d) $\int \sec^2 x dx = \tan x + c \rightarrow$ (iii)

Q.14

MATHEMATICS

$\int \sin^6 x \cdot \cos x \, dx$ equals:

(1) $\frac{\cos^7 x}{7} + c$

(2) $-\frac{\cos^7 x}{7} + c$

(3) $\checkmark \frac{\sin^7 x}{7} + c$

(4) $6 \sin^5 x + c$

✓ Answer: Option (3)

 SOLUTION

Explanation: Applying the substitution method correctly evaluates the power rule onto the $\sin x$ term.

Step-by-step:

Let $u = \sin x$, then $du = \cos x \cdot dx$. Substitute u and du into the integral:

$$\int u^6 \cdot du = \frac{u^7}{7} + c$$

Substitute $u = \sin x$ back:

$$\frac{\sin^7 x}{7} + c$$

Q.15

MATHEMATICS

The integral of $x \cos x$ with respect to ' x ' is:

(1) $x \cos x + \sin x + c$

(2) ✓ $x \sin x + \cos x + c$

(3) $\cos x + \sin x + c$

(4) $x(\sin x + \cos x) + c$

✓ Answer: Option (2)

 SOLUTION

Explanation: Correctly applies the integration by parts rule and properly handles the double negative.

Step-by-step:

Integration by Parts: $\int u \cdot dv = u \cdot v - \int v \cdot du$ Let $u = x$, $dv = \cos x \cdot dx$ $du = dx$, $v = \sin x$

$$\begin{aligned}\int x \cos x \cdot dx &= x(\sin x) - \int \sin x \cdot dx \\ &= x \sin x - (-\cos x) + c = x \sin x + \cos x + c\end{aligned}$$

The volume of solid generated by revolving the curve $y = \sqrt{x^2 + 5x}$ between $x = 1$ and $x = 2$ is:

(1) ✓ $\frac{59\pi}{6}$ cubic units

(2) $\frac{59}{6}$ cubic units

(3) $\frac{58\pi}{5}$ cubic units

(4) $\frac{59\pi}{5}$ cubic units

✓ Answer: Option (1)

 SOLUTION

Explanation: The definite integration strictly yields $59/6$, which is multiplied by π according to the volume formula.

Step-by-step:

$$V = \pi \int_1^2 y^2 dx = \pi \int_1^2 (x^2 + 5x) dx$$

$$\int (x^2 + 5x) dx = \left[\frac{x^3}{3} + \frac{5x^2}{2} \right]_1^2$$

Upper Limit ($x = 2$): $\frac{8}{3} + 10 = \frac{38}{3}$ Lower Limit ($x = 1$): $\frac{1}{3} + \frac{5}{2} = \frac{17}{6}$

$$V = \pi \left(\frac{38}{3} - \frac{17}{6} \right) = \pi \left(\frac{76}{6} - \frac{17}{6} \right) = \frac{59\pi}{6}$$

Q.17

MATHEMATICS

The value of $\sin 480^\circ$ is:

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

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

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

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

✓ Answer: Option (1)**SOLUTION****Explanation:** 480° co-terminates with 120° . Sine in the second quadrant is positive.**Step-by-step:**

$$\sin(480^\circ) = \sin(360^\circ + 120^\circ) = \sin(120^\circ)$$

Angle 120° is in the second quadrant where sine is positive.

$$\sin(180^\circ - 60^\circ) = \sin(60^\circ) = \frac{\sqrt{3}}{2}$$

Q.18

MATHEMATICS

 $\sin(A + B)$ is equal to:

(1) $\sin A \cdot \cos B - \cos A \cdot \sin B$

(2) $\checkmark \sin A \cdot \cos B + \cos A \cdot \sin B$

(3) $\cos A \cdot \cos B + \sin A \cdot \sin B$

(4) $\cos A \cdot \cos B - \sin A \cdot \sin B$

✓ Answer: Option (2)**SOLUTION****Explanation:** The expansion of the sine of a sum of two angles distributes the sine and cosine functions across both angles while maintaining the positive sign.**Step-by-step:**

Recall the fundamental compound angle identity for sine:

$$\sin(A + B) = \sin A \cdot \cos B + \cos A \cdot \sin B.$$

This distributes the sine and cosine functions across the two angles.

Q.19

MATHEMATICS

If $\cos A = \frac{12}{13}$ and $\sin B = \frac{3}{5}$ and A and B are acute angles, the value of $\cos(A - B)$ is:

(1) $\frac{56}{65}$

(2) $\frac{-16}{65}$

(3) $\frac{33}{65}$

(4) $\checkmark \frac{63}{65}$

✓ Answer: Option (4)

 SOLUTION

Explanation: Applying the $\cos(A - B)$ identity and solving the Pythagorean triplets correctly yields $63/65$.

Step-by-step:

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\sin A = \sqrt{1 - (12/13)^2} = 5/13$$

$$\cos B = \sqrt{1 - (3/5)^2} = 4/5$$

$$\cos(A - B) = \left(\frac{12}{13}\right)\left(\frac{4}{5}\right) + \left(\frac{5}{13}\right)\left(\frac{3}{5}\right) = \frac{48}{65} + \frac{15}{65} = \frac{63}{65}$$

Q.20

MATHEMATICS

The value of $\sin 125^\circ \cdot \sin 55^\circ$ is equal to:

(1) $\sin^2 35^\circ$

(2) $\checkmark \cos^2 35^\circ$

(3) $\sin 35^\circ$

(4) $\cos 35^\circ$

✓ Answer: Option (2)

 SOLUTION

Explanation: Proper trigonometric reduction via supplementary and complementary angles converts the expression to $\cos^2 35^\circ$.

Step-by-step:

$$\sin(125^\circ) = \sin(180^\circ - 55^\circ) = \sin 55^\circ$$

Expression becomes: $\sin 55^\circ \cdot \sin 55^\circ = \sin^2 55^\circ$ Apply complementary angle:

$$\sin 55^\circ = \cos(90^\circ - 55^\circ) = \cos 35^\circ$$

$$\sin^2 55^\circ = \cos^2 35^\circ$$

Section 2: Statistics

Q21 – Q30, Q37 – Q40

Q.21

STATISTICS

_____ is a method for graphically depicting groups of numerical data through their quartiles.

(1) Leaf - Plot

(2) ✓ Box - Plot

(3) Line - Plot

(4) Pie - Chart

✓ Answer: Option (2)

SOLUTION

Explanation: A Box-Plot is a standardized statistical graph used to display the distribution of data based on a five-number summary: minimum, first quartile (Q1), median (Q2), third quartile (Q3), and maximum.

Step-by-step:

A Box-Plot (or box-and-whisker plot) is specifically designed to display the five-number summary of a dataset: minimum, first quartile (Q1), median (Q2), third quartile (Q3), and maximum.

A Leaf-Plot (Stem-and-Leaf) shows individual data points.

A Line-Plot displays data points connected by line segments, usually over time.

A Pie-Chart shows categorical data as proportional slices.

Which of the following is true with respect to histogram?

(1) Histogram is represented for ordinal data set

(2) ✓ In histogram width is equal to the class interval and height is equal to relative frequency

(3) Histogram is used to represent continuous data which is equal to the width of class interval

(4) Histogram is used to represent the nominal data

✓ Answer: Option (2)



SOLUTION

Explanation: A histogram is a graphical representation of grouped continuous frequency distributions. The horizontal axis width corresponds strictly to the class interval, and the vertical height corresponds to frequency.

Step-by-step:

A histogram is used for continuous quantitative data (eliminating Options 1 and 4, which are for categorical/qualitative data).

The visual structure of a histogram consists of adjoining rectangular bars.

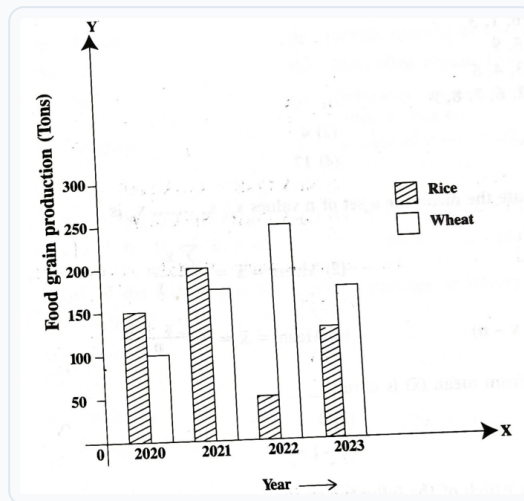
The horizontal width of each bar represents the class interval (or bin size).

The vertical height of each bar represents the frequency or relative frequency of the data falling within that interval.

Q.23

STATISTICS

In which years rice production is more than wheat?



(1) ✓ 2021 and 2022

(2) 2020 and 2023

(3) 2020 and 2021

(4) 2022 and 2023

✓ Answer: Option (1)

SOLUTION

Explanation: Based on reading the height of the bars directly from the graph, Rice exceeds Wheat strictly in 2021 and 2022. (Note:

Step-by-step:

Identify the legend: Rice is the shaded bar, Wheat is the blank (white) bar.

Analyze 2020: Rice (~ 150) < Wheat (~ 200).

Analyze 2021: Rice (~ 200) > Wheat (~ 180). (Rice is more).

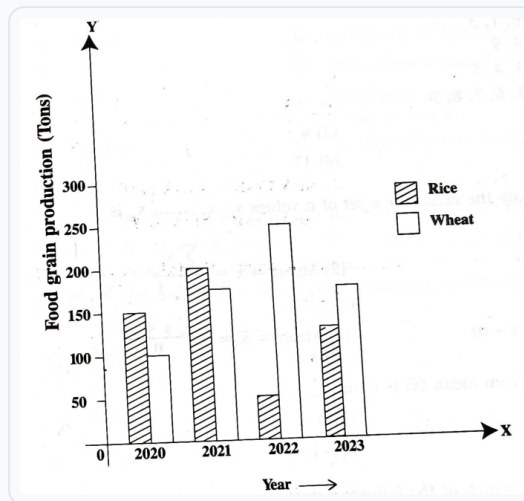
Analyze 2022: Rice (~ 250) > Wheat (~ 150). (Rice is more).

Analyze 2023: Rice (~ 100) < Wheat (~ 180).

Q.24

STATISTICS

In which two years was an equal number of wheat production observed?



(1) ✓ 2022 and 2023

(2) 2021 and 2023

(3) 2020 and 2021

(4) 2021 and 2022

✓ Answer: Option (1)

SOLUTION

Explanation: The blank bars for 2022 and 2023 are visually and numerically equal. (Note:

Step-by-step:

2020 Wheat = 200, 2021 Wheat = 100, 2022 Wheat = 150, 2023 Wheat = 150.

2022 Wheat = 2023 Wheat = 150

Q.25

STATISTICS

The number of leaves present in the following stem-leaf plot (Stem 1: 2, 4, 5, 7 | Stem 2: 0, 1, 3 | Stem 3: 5, 9 | Stem 4: 3, 4, 5 | Stem 5: 2, 6, 7, 8, 9)

(1) 5

(2) 4

(3) 12

(4) ✓ 17

✓ Answer: Option (4)

**SOLUTION**

Explanation: In a stem-and-leaf plot, each individual digit on the "leaf" side represents one individual data point.

Step-by-step:

Count the number of leaves for Stem 1: 4 leaves (2, 4, 5, 7).

Count the leaves for Stem 2: 3 leaves (0, 1, 3).

Count the leaves for Stem 3: 2 leaves (5, 9).

Count the leaves for Stem 4: 3 leaves (3, 4, 5).

Count the leaves for Stem 5: 5 leaves (2, 6, 7, 8, 9).

Total leaves = .

Q.26

STATISTICS

The formula to compute the mean for a set of n values is:

(1) ✓ $\bar{x} = \frac{\sum x_i}{n}$

(2) $\bar{x} = \frac{\sum x_i}{n-1}$

(3) $\bar{x} = \frac{\sum x_i}{2}$

(4) $\bar{x} = n \sum x_i$

✓ Answer: Option (1)

SOLUTION

Explanation: The arithmetic mean is fundamentally defined as the sum of all individual observations divided by the total number of observations.

Step-by-step:

The arithmetic mean is defined as the sum of all observations divided by the total number of observations.

Sum of observations is mathematically denoted by $\sum x_i$.

Total number of observations is n .

Therefore, $\bar{x} = \frac{\sum x_i}{n}$.

Q.27

STATISTICS

The sum of deviations from mean ($\bar{x}$) is always _____

(1) 1

(2) ✓ 0

(3) 2

(4) -1

✓ Answer: Option (2)

SOLUTION

Explanation: Mathematical proof demonstrates that the sum of the differences between each data point and the mean perfectly cancel each other out.

Step-by-step:

$$\sum (x_i - \bar{x}) = \sum x_i - \sum \bar{x} = n\bar{x} - n\bar{x} = 0$$

Q.28

STATISTICS

For the given set of data which of the following statements are correct? Statement A: Mean is uniquely defined for a set of data Statement B: Median does not depend on all the observations. Statement C: Mode is affected by extreme values

(1) ✓ A and B

(2) A and C

(3) B and C

(4) A, B and C

✓ Answer: Option (1)

 SOLUTION

Explanation: Statement A is true (one unique mean). Statement B is true (median is positional, unaffected by extreme ends). Statement C is false (mode is not affected by extreme values).

Step-by-step:

Analyze Statement A: A dataset has exactly one arithmetic mean. It is uniquely defined. (True).

Analyze Statement B: The median is merely the positional middle value when sorted. Changing the actual numerical value of the largest or smallest number does not change the median. Therefore, its value does not depend on all exact observations. (True).

Analyze Statement C: Mode is the most frequently occurring value. A sudden extreme outlier (e.g., changing a 10 to a 1000) does not change the frequency of the other numbers, so mode is not affected by extreme values. (False).

Q.29

STATISTICS

The formula to compute the quartile deviation (semi-interquartile range) of a dataset is:

(1) $\frac{Q_3 - Q_1}{Q_3 + Q_1}$

(2) $Q_3 - Q_1$

(3) $\frac{Q_3 + Q_1}{2}$

(4) ✓ $\frac{Q_3 - Q_1}{2}$

✓ Answer: Option (4)

 SOLUTION

Explanation: Quartile Deviation is strictly defined as half of the Interquartile Range ($Q_3 - Q_1$).

Step-by-step:

The Interquartile Range (IQR) measures the spread of the middle 50% of data and is defined as .

The Quartile Deviation is half of the Interquartile Range.

Therefore, .

Q.30

STATISTICS

Match the following and choose the correct option. List - I: (a) Range, (b) Mean, (c) Mode, (d) Median List - II: (i) Middle number in a sorted list of data, (ii) Most often repeated value in a data set, (iii) Difference between largest and smallest value of data set, (iv) Average of n observations Codes:

(1) a-iv, b-ii, c-i, d-iii;

(2) a-iii, b-iv, c-i, d-ii;

(3) ✓ a-iii, b-iv, c-ii, d-i;

(4) a-i, b-iii, c-iv, d-ii

✓ Answer: Option (3)

SOLUTION

Explanation: Range → Difference (iii). Mean → Average (iv). Mode → Most repeated (ii). Median → Middle number (i). Official Key Answer: Option (3)

Step-by-step:

Range = Max - Min (Difference between largest and smallest). So, a iii.

Mean = Average of all observations. So, b iv.

Mode = Most frequently occurring (repeated) value. So, c ii.

Median = The strict middle positional value. So, d i.

Combine the matches: a-iii, b-iv, c-ii, d-i.

Section 3: Programming

Q31 – Q36, Q41 – Q42

Q.31

PROGRAMMING

Which of the following is not a python package or library for science and numerical computations?

(1) Numpy

(2) ✓ Loops

(3) Matplotlib

(4) Pandas

✓ Answer: Option (2)

SOLUTION

Explanation: Loops are a core part of the programming language syntax, not an imported package for scientific computing.

Step-by-step:

Numpy is a core library for numerical computing (arrays/matrices).

Matplotlib is a library for plotting and data visualization.

Pandas is a library for data manipulation and analysis.

Loops (like for and while) are fundamental control flow structures built into the Python language itself, not an external package or library.

Q.32

PROGRAMMING

Why is indentation important in python?

(1) For Decoration

(2) ✓ To define blocks of code

(3) Increase speed

(4) To define libraries

✓ Answer: Option (2)

 SOLUTION

Explanation: Python relies strictly on leading whitespace (indentation) to determine the grouping of statements and define code blocks.

Step-by-step:

In languages like C, C++, or Java, blocks of code (like what belongs inside an if statement or a loop) are enclosed in curly braces {}.

Python was designed for high readability and discards curly braces.

Instead, Python uses leading whitespace (indentation) to explicitly define the scope and grouping of statements.

Q.33

PROGRAMMING

In python programming language when a loop is used inside another loop, it is called as

(1) For loop

(2) While loop

(3) ✓ Nested for loop

(4) Inside loop

✓ Answer: Option (3)

 SOLUTION

Explanation: "Nested" is the formal computer science terminology for placing one control structure inside another.

Step-by-step:

A loop running its own iterations inside the block of another loop is a standard programming construct.

The universal computer science term for this architecture is a "Nested loop".

Since "Nested for loop" is the only option presenting the term "Nested", it is the most accurate specific description provided.

Q.34

PROGRAMMING

Write the output of this programme `a = 5 b = 8 n = a**3 + b m = n % 2 print (m)`

(1) 0

(2) - 1

(3) ✓ 1

(4) 2

✓ Answer: Option (3)

 SOLUTION

Explanation: Following standard mathematical order of operations and applying the modulo correctly gives a remainder of 1.

Step-by-step:

$5^3 = 125$. Add 8 = 133. $133 \pmod{2} = 1$.

Q.35

PROGRAMMING

Match List - I with List - II and select the correct answer using the codes given below: List - I: (a) `a = 20`, (b) `b = "Hello Python"`, (c) `c = 12.5`, (d) `d = 3.0 + 4.1j` List - II: (i) Complex number, (ii) Integer, (iii) String, (iv) Float Codes:

(1) a-ii, b-iii, c-i, d-iv;

(2) a-iii, b-iv, c-ii, d-i;

(3) ✓ a-ii, b-iii, c-iv, d-i;

(4) a-i, b-ii, c-iii, d-iv

✓ Answer: Option (3)

 SOLUTION

Explanation: `20` → Integer. `"Text"` → String. `12.5` → Float. `3.0+4.1j` → Complex.

Step-by-step:

`a = 20` is a whole number without a decimal point. This is an int (Integer). (a ii)

`b = "Hello Python"` is text enclosed in quotation marks. This is a str (String). (b iii)

`c = 12.5` is a number containing a decimal point. This is a float. (c iv)

`d = 3.0 + 4.1j` contains a real part and an imaginary part (denoted by j in Python). This is complex. (d i)

Correct combination: a-ii, b-iii, c-iv, d-i.

Q.36

PROGRAMMING

What is the output of the given programme? `x = 0 if x == 1: print ("A") else : print ("B")`

(1) ✓ B

(2) A

(3) error

(4) No output

✓ Answer: Option (1)

 SOLUTION

Explanation: The if condition is false, so the flow logically routes directly to the else block.

Step-by-step:

$x = 0$. Condition $0 == 1$ is False. Execution goes to else, printing "B".

Q.37

STATISTICS

Number of students in a class room is an example of _____

(1) Qualitative data

(2) ✓ Quantitative data and discrete data

(3) Ordinal data

(4) Quantitative and continuous data

✓ Answer: Option (2)

 SOLUTION

Explanation: Since "number of students" involves numerical counting, it is Quantitative. You cannot have fractional students, so it must be Discrete.

Step-by-step:

Quantitative vs Qualitative: A "number of students" is a measurable amount, meaning it is numerical/Quantitative. It is not a descriptive category (Qualitative).

Discrete vs Continuous: You can only have whole students (e.g., 40, 41, 42). You cannot have 40.5 students. Data that can only take specific, distinct integer values is "Discrete". Continuous data can be any decimal on a scale (like height or weight).

Q.38

STATISTICS

The fastest data collection tool is _____

(1) Interview

(2) Survey

(3) ✓ Google form survey

(4) Group discussion

✓ Answer: Option (3)

SOLUTION

Explanation: The digital, automated nature of cloud-based forms like Google Forms makes them objectively faster than any manual or face-to-face method.

Step-by-step:

Data collection speed is evaluated by how quickly one can reach respondents and aggregate the results. Face-to-face methods like Interviews and Group discussions require scheduling, physical presence, and manual transcribing. They are very slow.

Traditional paper surveys require physical distribution and manual data entry.

A Google Form survey is electronic. It can be distributed instantly to thousands of people worldwide via a single link, and the platform automatically aggregates and tabulates the responses in real-time.

Match List - I (Examples) with List - II (Data types) and select the correct answer List - I: (a) Height of a person, (b) Number of teachers in a school, (c) Aadhar Number, (d) Student grades
List - II: (i) Nominal data, (ii) Continuous data, (iii) Ordinal data, (iv) Discrete data Codes:

(1) a-ii, b-i, c-iii, d-iv;

(2) a-iv, b-ii, c-i, d-iii;

(3) ✓ a-ii, b-iv, c-i, d-iii;

(4) a-iii, b-i, c-iv, d-ii

✓ Answer: Option (3)

SOLUTION

Explanation: Height → Continuous. Number of teachers → Discrete. Aadhar → Nominal. Grades → Ordinal.
Sequence: a-ii, b-iv, c-i, d-iii.

Step-by-step:

Height of a person: Can be exactly 170.5 cm, 170.55 cm, etc. It spans an infinite range of decimals.
Therefore, Continuous data. (a ii)

Number of teachers: Must be a whole number count (e.g., 25). Therefore, Discrete data. (b iv)

Aadhar Number: Even though it consists of numbers, it is just a label or an ID tag. It holds no numeric weight (a higher Aadhar number doesn't mean a "better" citizen). Therefore, Nominal data. (c i)

Student grades: Letters like A, B, C, D imply an inherent ranking or order (A is better than B), but the distance between them isn't mathematically quantified. Therefore, Ordinal data. (d iii)

Correct Sequence: a-ii, b-iv, c-i, d-iii.

Q.40

STATISTICS

The process of grouping the data according to their characteristics is called

(1) Organisation of data

(2) ✓ Classification of data

(3) Tabulation of data

(4) Presentation of data

✓ Answer: Option (2)

SOLUTION

Explanation: "Classification" is the precise academic term used for grouping data based on similarities and characteristics.

Step-by-step:

When raw data is collected, it is a jumbled mass.

The specific act of dividing this data into different homogenous classes or groups based on shared attributes/characteristics (like grouping people by age brackets, or cars by manufacturer) is strictly defined as Classification.

Organization is the broader term that includes classification and sorting. Tabulation is specifically putting classified data into rows and columns. Presentation refers to charting or graphing.

Q.41

PROGRAMMING

Find the output of the following program. `main ( ) { int a = 125; Printf ("%d\n", 10 + a ++); }`

(1) 136

(2) ✓ 135

(3) 126

(4) 125

✓ Answer: Option (2)

SOLUTION

Explanation: The value 135 is printed, and a updates to 126 in memory afterward.

Step-by-step:

Because ++ is a post-increment operator, the current value of a (125) is used for the addition before incrementing. $10 + 125 = 135$.

Q.42

PROGRAMMING

Which of the following is an example for valid identifier?

(1) \$abcd

(2) 12_34a

(3) /M_ab

(4) ✓ abcd

✓ Answer: Option (4)

SOLUTION

Explanation: "abcd" contains only valid alphabetic characters and starts with a letter, making it a perfectly valid identifier. The others use illegal symbols or start with numbers.

Step-by-step:

Rule 1: Identifiers must start with a letter (a-z, A-Z) or an underscore _.

Rule 2: They cannot start with a digit.

Rule 3: They cannot contain special characters like @, , /, -. *Evaluating the options* :abcd starts with \$ (Invalid).

12_34a starts with a digit (Invalid).

/M_ab starts with / (Invalid).

abcd consists entirely of valid letters (Valid).

Section 4: Computer Science

Q43, Q49 – Q52

Q.43

COMPUTER SCIENCE

Match standard symbols (List - I) used in program flowcharts with the purpose of use (List - II).

List - I: (a) Parallelogram, (b) Diamond, (c) Rectangle with double vertical lines, (d) Rectangle

List - II: (i) Input/Output, (ii) Predefined processing, (iii) Computer Processing, (iv) Decision Codes:

(1) a - i, b - iii, c - iv, d - ii

(2) ✓ a - i, b - iv, c - ii, d - iii

(3) a - iii, b - ii, c - iv, d - i

(4) a - i, b - iv, c - iii, d - ii

✓ Answer: Option (2)



SOLUTION

Explanation: Parallelogram → Input/Output. Diamond → Decision. Double-line Rectangle → Predefined processing. Rectangle → Processing.

Step-by-step:

Parallelogram (a): Universally used to denote an Input or Output operation. (a i)

Diamond (b): Represents a conditional Decision point (Yes/No branches). (b iv)

Rectangle with double vertical lines (c): Denotes a Predefined Process or a Subroutine. (c ii)

Rectangle (d): Represents standard Process / Computer Processing step. (d iii)

The resulting sequence is a-i, b-iv, c-ii, d-iii.

Section 5: Web Technologies

Q44 – Q48

Q.44

WEB TECHNOLOGIES

Which of the following is not a valid component of an Android application?

(1) Activity

(2) Service

(3) Application

(4) ✓ Communication

✓ Answer: Option (4)

SOLUTION

Explanation: "Communication" is a generic computing concept, not a distinct, programmable architectural component class within the Android OS SDK.

Step-by-step:

The primary structural components of an Android App are: Activities, Services, Broadcast Receivers, and Content Providers.

The Application class is also a fundamental base class in Android that maintains global application state.

"Communication" is a general concept (like networking or IPC), but it is not the name of an Android architectural component class.

Match the following CSS property to the effect it has on the webpage. List - I (Property): (a) Padding, (b) Margin, (c) Z-index, (d) Opacity List - II (Effect): (i) Specifies the transparency level of an element, (ii) Creates space inside an element, around the content, (iii) Creates space outside an element's border, (iv) Controls the vertical stacking order of elements Codes:

(1) a - iii, b - ii, c - iv, d - i

(2) ✓ a - ii, b - iii, c - iv, d - i

(3) a - ii, b - iii, c - i, d - iv

(4) a - i, b - iv, c - iii, d - ii

✓ Answer: Option (2)

SOLUTION

Explanation: Flawlessly pairs frontend CSS styling syntax with the exact rendering behavior (Padding=inside, Margin=outside, Z-index=stack, Opacity=transparency).

Step-by-step:

Padding (a): Defines the space inside the border, pushing the content inward. (a ii)

Margin (b): Defines the space outside the border, pushing other elements away. (b iii)

Z-index (c): Determines which elements overlap others (vertical stacking/depth). (c iv)

Opacity (d): Determines how see-through/transparent an element is. (d i)

The sequence is a-ii, b-iii, c-iv, d-i.

Q.46

WEB TECHNOLOGIES

Which of the following software applications is primarily used to read and render HTML web pages?

(1) Server

(2) Operating system

(3) ✓ Web browser

(4) Database

✓ Answer: Option (3)

**SOLUTION**

Explanation: Rendering HTML code into a visible graphical webpage is the primary, defining function of a web browser.

Step-by-step:

HTML (HyperText Markup Language) is plain text code that dictates the structure of a webpage.

A Web browser (like Chrome, Firefox, Safari) is the client-side software specifically engineered to parse this HTML code and "render" it into the graphical layout you see on screen.

Servers store/send the files, OS manages the hardware, and Databases store dynamic data.

Q.47

WEB TECHNOLOGIES

Give the JavaScript method that removes the last element of an array

(1) Shift ()

(2) ✓ POP ()

(3) Slice ()

(4) Splice ()

✓ Answer: Option (2)

**SOLUTION**

Explanation: The pop() method acts exactly like a stack data structure pop operation, specifically removing the tail (last) element.

Step-by-step:

Arrays in JavaScript function similarly to stacks.

The pop() method specifically removes the last element from an array and returns that element.

The shift() method removes the first element.

slice() and splice() are used for extracting or replacing middle sections of an array.

Q.48

WEB TECHNOLOGIES

In a standard HTML form submission, what is the correct order of operations? (a) Form validation (client-side) (b) HTTP Request sent (c) User clicks submit (d) Server Response/Redirect

(1) a c b d**(2)** ✓ c a b d**(3)** c b a d**(4)** a b c d

✓ Answer: Option (2)

**SOLUTION**

Explanation: User clicks (c) → JS validates (a) → Browser sends request (b) → Server responds (d).

Step-by-step:

The process initiates when the User clicks submit (c).

Before the browser sends anything over the network, it runs Client-side Form Validation (a) using HTML5/JavaScript to ensure fields aren't empty.

If validation passes, the browser constructs and sends the HTTP Request (b) (e.g., a POST request) to the server.

The server processes the data and sends back a Server Response or Redirect (d) (e.g., "Thank you" page).

Correct chronological sequence: c a b d.

Match the functional areas of operation (List - I) with business function (List - II) with respect to Enterprise Resource Planning. List - I: (a) Marketing and sales, (b) Accounting and Finance, (c) Human Resources, (d) Supply chain management List - II: (i) Purchasing goods and new materials, (ii) Recruiting and hiring, (iii) Marketing a product, (iv) Financial accounting of payments from customers and to suppliers Codes:

(1) a - i, b - ii, c - iv, d - iii

(2) ✓ a - iii, b - iv, c - ii, d - i

(3) a - iii, b - ii, c - iv, d - i

(4) a - ii, b - iii, c - i, d - iv

✓ Answer: Option (2)

SOLUTION

Explanation: Correctly maps standard corporate departments to their primary operational duties within an ERP framework.

Step-by-step:

Marketing and sales (a): Handles advertising, selling, and marketing a product (iii). (a iii)

Accounting and Finance (b): Handles financial accounting of payments (iv). (b iv)

Human Resources (c): Handles recruiting and hiring personnel (ii). (c ii)

Supply chain management (d): Handles logistics, purchasing goods, and materials (i). (d i)

The combined sequence is a-iii, b-iv, c-ii, d-i.

Q.50

COMPUTER SCIENCE

Which of the following modules of Enterprise Resource Planning handle payroll and employee related data?

(1) Supply chain Management

(2) Marketing Automation

(3) ✓ Human Resource Management

(4) Accounting and Finance

✓ Answer: Option (3)

SOLUTION

Explanation: The HRM module is specifically built to centralize all employee-related data and automate payroll processes.

Step-by-step:

Look at the key terms: "payroll" and "employee related data".

In corporate structures and ERP systems (like SAP or Oracle), anything pertaining to the lifecycle, compensation, and data of employees is strictly managed by the HR department.

Therefore, the Human Resource Management (HRM) module handles this.

Q.51**COMPUTER SCIENCE**

Choose the correct sequence of events for any sale with respect to SAP Enterprise resource planning sales. (i) Pre-sales activities, (ii) Inventory sourcing, (iii) Billing, (iv) Payment, (v) Sales order processing, (vi) Delivery

(1) (i), (iii), (iv), (ii), (v), (vi)

(2) (i), (iv), (iii), (v), (vi), (ii)

(3) ✓ (i), (v), (ii), (vi), (iii), (iv)

(4) (ii), (v), (iii), (vi), (iv), (i)

✓ Answer: Option (3)

SOLUTION

Explanation: Standard Order-to-Cash process: Pre-sales → Order → Inventory → Delivery → Billing → Payment.

Step-by-step:

Pre-sales (i): Customer inquiries and quotations.

Sales order processing (v): The actual order is placed and logged into the system.

Inventory sourcing (ii): The system checks if the product is in stock (Availability Check).

Delivery (vi): The goods are picked, packed, and shipped to the customer.

Billing (iii): An invoice is generated and sent to the customer based on the delivery.

Payment (iv): The customer's money is received and logged by accounting.

Correct chronological order: (i), (v), (ii), (vi), (iii), (iv).

Q.52**COMPUTER SCIENCE**

Which of the following is a part of business process automation technology stack?

(1) ✓ Low-code development

(2) Android development

(3) Software design and development

(4) Hardware development

✓ Answer: Option (1)

SOLUTION

Explanation: Low-code platforms provide visual drag-and-drop interfaces specifically engineered for rapid business process workflow automation.

Step-by-step:

Business Process Automation (BPA) aims to let businesses automate routine workflows without needing heavy, traditional coding for every task.

Low-code/No-code development platforms (like Microsoft Power Automate, Zapier, or Appian) form the core of the modern BPA technology stack, allowing business users to visually map and automate processes.

Android, general Software, or Hardware development are broad IT fields, not specific stacks for automating existing business processes.

Section 6: Cloud Computing

Q53 – Q56

Q.53

CLOUD COMPUTING

Which is the example of SaaS cloud service models?

(1) AWS Lambda

(2) Amazon EC2

(3) Google App Engine

(4) ✓ Gmail

✓ Answer: Option (4)

SOLUTION

Explanation: Gmail is a finished software product accessed via the web by end-users, fitting the exact definition of Software as a Service (SaaS).

Step-by-step:

SaaS (Software as a Service): A complete, functional end-user application delivered over the internet. Gmail is a perfect example; users just log in and use the email software.

IaaS (Infrastructure as a Service): Provides raw servers/storage. Amazon EC2 is an example.

PaaS (Platform as a Service): Provides a framework for developers to build apps. Google App Engine is an example.

FaaS (Function as a Service): AWS Lambda is Serverless/FaaS.

Q.54**CLOUD COMPUTING**

Identify which of the following is NOT a characteristic of a public cloud?

(1) Multi-tenancy

(2) High availability and Redundancy

(3) Managed by a third-party provider

(4) ✓ Dedicated hardware for single user

✓ Answer: Option (4)

 SOLUTION

Explanation: Public clouds pool resources (multi-tenancy). Dedicated physical hardware exclusively for one user is a characteristic of a Private Cloud.

Step-by-step:

A Public Cloud (like AWS, Azure) is owned by a third-party (Option 3), offers high availability (Option 2), and uses a multi-tenant architecture where multiple different customers share the same physical servers securely partitioned by software (Option 1).

Dedicated hardware for a single user/organization is the defining characteristic of a Private Cloud or an on-premises data center.

Match List - I (Types of Cloud services) with List - II (service) and select the correct answer. List - I: (a) IaaS, (b) PaaS, (c) SaaS, (d) Serverless computing List - II: (i) Delivers software application over the internet, (ii) Allows developers to build applications without managing servers, (iii) Provides fundamental computing, network and storage resources, (iv) Offers a hosted environment for developers to build, test and deploy applications Codes:

(1) a - iv, b - iii, c - ii, d - i

(2) a - iii, b - ii, c - i, d - iv

(3) ✓ a - iii, b - iv, c - i, d - ii

(4) a - i, b - iii, c - ii, d - iv

✓ Answer: Option (3)

SOLUTION

Explanation: IaaS=Computing/storage (iii), PaaS=Hosted env (iv), SaaS=Software over internet (i), Serverless=Without managing servers (ii).

Step-by-step:

IaaS (a): Provides the lowest level—fundamental computing, network, and storage (iii). (a iii)

PaaS (b): Provides a hosted environment framework specifically for building/deploying (iv). (b iv)

SaaS (c): Delivers finished software apps to end users (i). (c i)

Serverless (d): The defining trait is running code without the developer managing or provisioning the underlying servers (ii). (d ii)

The sequence is a-iii, b-iv, c-i, d-ii.

Match List - I (Cloud deployment models) with List - II (operations). List - I: (a) Public cloud, (b) Private cloud, (c) Hybrid cloud, (d) Community cloud List - II: (i) Designed for shared needs of multiple organizations, (ii) A combination of public and private clouds, (iii) Resources are used by a single organization, (iv) Resources are owned and operated by third-party provider Codes:

(1) a - i, b - ii, c - iii, d - iv

(2) ✓ a - iv, b - iii, c - ii, d - i

(3) a - iii, b - iv, c - i, d - ii

(4) a - ii, b - iii, c - iv, d - i

✓ Answer: Option (2)

SOLUTION

Explanation: Accurately reflects standard IT deployment definitions mapping Public to Third-party, Private to Single org, Hybrid to Combo, Community to Shared needs.

Step-by-step:

Public cloud (a): Owned and operated by a third-party (iv). (a iv)

Private cloud (b): Used exclusively by a single organization (iii). (b iii)

Hybrid cloud (c): A direct combination of public and private infrastructures (ii). (c ii)

Community cloud (d): Shared infrastructure for multiple organizations with common concerns (e.g., hospitals sharing compliant servers) (i). (d i)

The sequence is a-iv, b-iii, c-ii, d-i.

Section 7: Cyber Security

Q57 – Q60

Q.57

CYBER SECURITY

What mechanism does a firewall use to decide whether to allow or block network traffic?

(1) The physical location of the device

(2) ✓ Pre-defined security rules and criteria

(3) Type of operating system used

(4) Source code of the application

✓ Answer: Option (2)



SOLUTION

Explanation: Firewalls operate by comparing the headers of packets against an Access Control List consisting of strictly pre-defined security rules.

Step-by-step:

A firewall acts as a digital barrier between a trusted internal network and an untrusted external network (like the internet).

It operates by inspecting incoming and outgoing traffic packets.

The firewall consults an Access Control List (ACL) consisting of pre-defined security rules and criteria (such as blocking certain IP addresses or ports). If a packet matches an "allow" rule, it passes; otherwise, it is blocked.

Q.58

CYBER SECURITY

Which of the following is true about spear phishing?

(1) Spear phishing does not involve malicious links

(2) Phishing is only used for stealing credit card information

(3) ✓ Spear phishing targets a specific individual or organization

(4) Spear phishing uses telephone calls instead of emails

✓ Answer: Option (3)



SOLUTION

Explanation: The term "spear" denotes the highly targeted, sniper-like focus on a single specific entity or high-value individual.

Step-by-step:

Phishing is a broad cyber attack where mass deceptive emails are sent to thousands of random people hoping a few fall for it.

Spear Phishing is a highly customized attack. Attackers research a specific individual or organization and craft an email highly relevant to them (e.g., impersonating their boss) to increase the likelihood of success.

Q.59**CYBER SECURITY**

Match List - I (Cyber threats) with List - II (attacks). List - I: (a) Phishing, (b) Ransomware, (c) DoS attack, (d) Supply chain attack List - II: (i) Threatening to leak data, (ii) Overwhelming server to disrupt services, (iii) Compromising vendors to infiltrate target organization, (iv) Attackers are deceptive emails to reveal credentials Codes:

(1) a - i, b - iii, c - ii, d - iv

(2) a - iii, b - iv, c - i, d - ii

(3) ✓ a - iv, b - i, c - ii, d - iii

(4) a - ii, b - iv, c - iii, d - i

✓ Answer: Option (3)

 SOLUTION

Explanation: Accurately aligns threat vectors with operations (Phishing=emails, Ransomware=leak data, DoS=overwhelming, Supply Chain=vendors).

Step-by-step:

Phishing (a): Deceptive emails trying to steal credentials (iv). (a iv)

Ransomware (b): Encrypting data and threatening to leak or destroy it unless a ransom is paid (i). (b i)

DoS attack (Denial of Service) (c): Flooding/overwhelming a server with traffic to crash it (ii). (c ii)

Supply chain attack (d): Hacking a weaker third-party vendor to gain access to the main target (iii). (d iii)

The sequence is a-iv, b-i, c-ii, d-iii.

Q.60

CYBER SECURITY

Which type of malware is capable of self-replication and spreading by creating copies of itself through infected systems?

(1) Trojan Horses

(2) Logic Bombs

(3) Spyware

(4) ✓ Computer worms

✓ Answer: Option (4)



SOLUTION

Explanation: Autonomous self-replication and spreading across networks without human intervention are the definitive characteristics of a computer worm.

Step-by-step:

Trojan Horses trick users into downloading them by pretending to be legitimate software. They do not self-replicate.

Logic Bombs execute malicious code when a specific condition is met.

Spyware silently monitors and steals data.

Computer Worms are standalone malicious programs that actively self-replicate and travel across networks independently without needing a host file or human intervention.

Section 8: Electrical Engineering

Q61 – Q80

Q.61

ELECTRICAL ENGINEERING

The material NOT used as an active extinguishing agent in fire extinguishers is:

(1) Carbon Dioxide (CO_2)

(2) Foam

(3) Dry powder

(4) ✓ Nitrogen

✓ Answer: Option (4)

SOLUTION

Explanation: Nitrogen is merely a pressurizing propellant gas in standard portable extinguishers, not the primary active extinguishing medium.

Step-by-step:

Standard fire extinguishers classify their active extinguishing agents based on the type of fire (Class A, B, C, etc.).

Carbon Dioxide () is used for electrical fires.

Foam is used for liquid fires (petrol/oil).

Dry chemical powder is used as a versatile multi-purpose extinguisher.

Nitrogen gas is sometimes used as a propellant to pressurize the cylinder, but it is not the primary active extinguishing material deployed to smother the fire in standard commercial classifications.

Q.62

ELECTRICAL ENGINEERING

Pipe material used in earthing is

(1) Nickel & Aluminium

(2) Aluminium & Tungsten

(3) Tungsten & Galvanised Iron

(4) ✓ Galvanised Iron

✓ Answer: Option (4)

 SOLUTION

Explanation: Galvanised Iron is specifically mandated by safety codes because its zinc coating protects against underground soil corrosion.

Step-by-step:

Earthing (grounding) requires a material that is highly conductive but also extremely resistant to soil corrosion, as the pipe is buried deep underground.

Copper and Galvanised Iron (GI) are the two standard materials used globally for this purpose.

Galvanisation (coating iron with zinc) prevents the iron pipe from rusting when exposed to underground moisture.

Q.63

ELECTRICAL ENGINEERING

Which one of the following is the conventional source of Electrical Energy?

(1) Solar Power

(2) Wind Power

(3) Tidal Power

(4) ✓ Thermal Power

✓ Answer: Option (4)

 SOLUTION

Explanation: Thermal Power represents the traditional, non-renewable combustion method of energy generation (conventional source).

Step-by-step:

Energy sources are classified as Conventional (Non-renewable, traditional) and Non-Conventional (Renewable, modern).

Solar, Wind, and Tidal power are Non-Conventional, renewable energy sources.

Thermal power relies on burning fossil fuels (like coal, oil, or natural gas) to heat water and drive turbines.

This is a traditional, non-renewable method.

Which of the following electrical quantities and their SI units are correctly paired? (a) Current - Ampere (b) Emf - Volts (c) Electrical Energy - Watts (d) Resistance - Mho Codes:

(1) a, b, c and d

(2) ✓ Only a and b

(3) Only c and d

(4) Only b and c

✓ Answer: Option (2)



SOLUTION

Explanation: Current (Ampere) and EMF (Volts) are correct. Energy is measured in Joules (not Watts). Resistance is Ohms (not Mho).

Step-by-step:

Current (a): The SI unit is Ampere. (Correct pair)

Emf (Electromotive Force) (b): The SI unit is Volts. (Correct pair)

Electrical Energy (c): The SI unit is Joules (or kWh). Watts is the unit of Power, not Energy. (Incorrect pair)

Resistance (d): The SI unit is Ohms (Ω). Mho (or Siemens) is the unit of Conductance. (Incorrect pair)

Only pairs (a) and (b) are factually correct.

Match List - I (Electrical Quantity) with List - II (Measuring Instruments) and select the correct answer given below List - I: (a) Current, (b) Potential difference, (c) Power, (d) Resistance List - II: (i) Voltmeter, (ii) Ammeter, (iii) Ohmmeter, (iv) Watt meter Codes:

(1) ✓ a - ii, b - i, c - iv, d - iii

(2) a - iv, b - i, c - ii, d - iii

(3) a - iii, b - iv, c - i, d - ii

(4) a - ii, b - iii, c - iv, d - i

✓ Answer: Option (1)

SOLUTION

Explanation: Pairs fundamental quantities perfectly: Current(Ammeter), Voltage(Voltmeter), Power(Wattmeter), Resistance(Ohmmeter).

Step-by-step:

Current (a): Measured by an Ammeter (ii). (a ii)

Potential difference/Voltage (b): Measured by a Voltmeter (i). (b i)

Power (c): Measured by a Wattmeter (iv). (c iv)

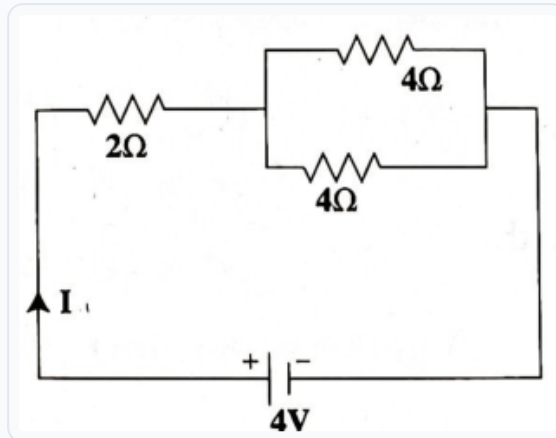
Resistance (d): Measured by an Ohmmeter (iii). (d iii)

Resulting sequence: a-ii, b-i, c-iv, d-iii.

Q.66

ELECTRICAL ENGINEERING

Find the value of current 'I' in the circuit given:



(1) 2A

(2) ✓ 1A

(3) 1.5A

(4) 2.5A

✓ Answer: Option (2)

 SOLUTION

Explanation: Resolving the parallel node and applying Ohm's law yields 1 Ampere.

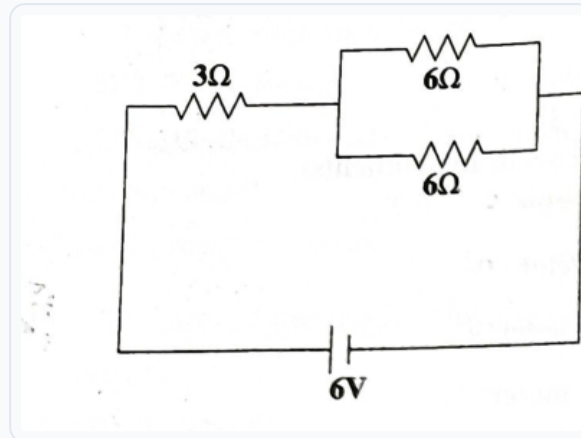
Step-by-step:

Parallel resistance: $R_p = \frac{4 \times 4}{4 + 4} = 2\Omega$. Total resistance: $R_t = 2\Omega + 2\Omega = 4\Omega$. Current: $I = \frac{V}{R_t} = \frac{4}{4} = 1A$.

Q.67

ELECTRICAL ENGINEERING

For the circuit given, calculate the voltage drop across Resistor:



(1) 6 V

(2) ✓ 3 V

(3) 1 V

(4) 2 V

✓ Answer: Option (2)

 SOLUTION

Explanation: The 3Ω series resistor consumes exactly half the 6V supply.

Step-by-step:

Parallel block: $R_p = \frac{6 \times 6}{6 + 6} = 3\Omega$. Total resistance: $R_t = 3\Omega + 3\Omega = 6\Omega$. Total Current: $I = \frac{6}{6} = 1\text{A}$.

Voltage drop across series 3Ω : $V = 1\text{A} \times 3\Omega = 3\text{V}$.

The function/s of fuse wire is/are to (a) Carry normal working current without heating (b) Break the circuit during short circuit (c) Protect the circuit from undervoltage (d) Protect the circuit from overvoltage

(1) a, b & c

(2) b only

(3) ✓ a & b

(4) a, b & d

✓ Answer: Option (3)

SOLUTION

Explanation: A fuse is a thermal current device. It carries safe loads and melts under high short-circuit currents. It does not regulate voltage spikes.

Step-by-step:

A fuse is a deliberately inserted weak link in a circuit made of a low-melting-point alloy.

Statement (a): It is rated to carry the normal load current continuously without overheating or melting. (True)

Statement (b): If a short circuit or overload occurs, the excess current generates immense heat (), melting the wire and breaking the circuit. (True)

Statements (c) and (d): Fuses react purely to current, not voltage. They do not inherently detect or protect against undervoltage or overvoltage (unless the overvoltage directly causes a massive current spike, but that's an indirect effect. Relays and varistors handle voltage issues). (False)

Rating of a fuse wire is

(1) Maximum current at which a fuse burns

(2) Maximum voltage at which the fuse burns

(3) ✓ Maximum current which fuse can carry without burning

(4) Minimum current at which fuse burns

✓ Answer: Option (3)

SOLUTION

Explanation: Fuse "rating" is strictly defined as its safe continuous load capacity—the max current it can carry indefinitely without deteriorating.

Step-by-step:

When you buy a "5 Amp fuse," that rating does not mean it blows exactly at 5 Amps.

The rating indicates the safe continuous load. It is the maximum amount of current the fuse can carry indefinitely without getting hot enough to melt.

The fuse will actually burn/blow at a value slightly higher than its rated current (the fusing current).

Match the following related to fuses and their applications. List - I (Fuses): (a) Glass cartridge fuse, (b) Kit Kat Fuse, (c) HRC Fuse, (d) Fuse wire List - II (Applications): (i) Emergency protection of electrical circuits, (ii) Power distribution systems, (iii) Electronic equipments, (iv) Residential, small scale industrial applications Codes:

(1) a - ii, b - iii, c - iv, d - i

(2) ✓ a - iii, b - iv, c - ii, d - i

(3) a - iv, b - i, c - ii, d - iii

(4) a - iii, b - ii, c - iv, d - i

✓ Answer: Option (2)

SOLUTION

Explanation: Glass → Electronics. Kit Kat → Residential. HRC → Power grid. Raw wire → Emergency.

Step-by-step:

Glass cartridge fuse (a): Small, transparent fuses universally used inside delicate Electronic equipments (iii). (a iii)

Kit Kat Fuse (b): Semi-enclosed rewirable porcelain fuses traditionally used in Residential and small industrial boards (iv). (b iv)

HRC (High Rupturing Capacity) Fuse (c): Used for handling massive fault currents in high-tension Power distribution systems (ii). (c ii)

Fuse wire (d): The raw wire used for quick, fundamental Emergency protection (i). (d i)

Sequence: a-iii, b-iv, c-ii, d-i.

If N_1 represents the number of turns in primary windings and N_2 represents the number of turns in secondary windings of a transformer:

List - I (No. of turns): (a) $N_1 = N_2$, (b) $N_1 < N_2$, (c) $N_1 > N_2$, (d) Only one winding

List - II (Name of transformer): (i) Auto transformer, (ii) Isolation transformer, (iii) Step-up transformer, (iv) Step-down transformer

Codes:

(1) ✓ a - ii, b - iii, c - iv, d - i

(2) a - i, b - ii, c - iii, d - iv

(3) a - iii, b - ii, c - iv, d - i

(4) a - ii, b - i, c - iii, d - iv

✓ Answer: Option (1)



SOLUTION

Explanation: Equal turns = Isolation. $N_1 < N_2$ = Step-up. $N_1 > N_2$ = Step-down. Single winding = Auto transformer.

Step-by-step:

(a): Voltage is neither stepped up nor down; it remains 1:1. This is strictly used to decouple circuits. It is an Isolation transformer (ii). (a ii)

(b): More turns on the secondary means the voltage increases. This is a Step-up transformer (iii). (b iii)

(c): Fewer turns on the secondary means the voltage decreases. This is a Step-down transformer (iv). (c iv)

Only one winding (d): A transformer that uses a single tapped continuous winding for both primary and secondary is an Auto transformer (i). (d i)

Sequence: a-ii, b-iii, c-iv, d-i.

Identify the properties of ideal transformer. An ideal transformer is one that has (a) No winding resistance (b) No leakage flux (c) No iron losses (d) High winding resistance

(1) ✓ (a), (b) and (c)

(2) (b), (c) and (d)

(3) (c) and (d)

(4) Only (d)

✓ Answer: Option (1)

SOLUTION

Explanation: An ideal machine model assumes 100% efficiency. "High winding resistance" contradicts an ideal assumption.

Step-by-step:

An "ideal" machine in physics is a hypothetical model assumed to be 100% efficient.

For an ideal transformer, we assume zero copper losses, meaning the coils have no winding resistance (a).

We assume all magnetic lines cut both coils perfectly, meaning no leakage flux (b).

We assume the core is perfect and dissipates no heat, meaning no iron/core losses (c).

High winding resistance (d) would create massive heat and voltage drops, which is the exact opposite of an ideal scenario.

Q.73**ELECTRICAL ENGINEERING**

A 1000/100V, 20 kVA transformer has 50 turns in the secondary. Calculate primary turns.

(1) 50

(2) ✓ 500

(3) 5

(4) 5000

✓ Answer: Option (2)

 SOLUTION

Explanation: Applying the fundamental turns ratio equation yields exactly 500 primary turns.

Step-by-step:

$$\frac{V_1}{V_2} = \frac{N_1}{N_2}$$

$$\frac{1000}{100} = \frac{N_1}{50}$$

$$10 \times 50 = N_1 \Rightarrow 500$$

Q.74

ELECTRICAL ENGINEERING

The working principle of transformer is based on _____.

(1) Coulomb's law

(2) ✓ Faraday's Law

(3) Newton's Law

(4) Ohm's Law

✓ Answer: Option (2)

 SOLUTION

Explanation: Faraday's Law of Mutual Electromagnetic Induction is the absolute foundational physics principle allowing transformers to transfer AC power.

Step-by-step:

A transformer works by passing alternating current through a primary coil, which creates a fluctuating magnetic field.

This fluctuating magnetic field passes through a secondary coil, inducing an electromotive force (voltage) in it.

The phenomenon of a changing magnetic field inducing a voltage in a circuit is strictly defined by Faraday's Law of Electromagnetic Induction.

Q.75

ELECTRICAL ENGINEERING

The capacity of battery is primarily measured in

(1) Voltage (V)

(2) Power (W)

(3) ✓ Ampere-hours (AH)

(4) Current (I)

✓ Answer: Option (3)

 SOLUTION

Explanation: Capacity indicates the total electrical charge stored over time, hence Ampere-hours.

Step-by-step:

The capacity of a battery tells you how much total electrical charge it can store and deliver over time.

It is calculated by multiplying the current (in Amperes) by the time (in hours) the battery can sustain that current before draining.

Therefore, the unit is Ampere-hours (AH) or milliampere-hours (mAh) for smaller batteries.

Identify the logic gate in which the output is high, when the two inputs are different

(1) AND gate

(2) OR gate

(3) ✓ XOR gate

(4) NAND gate

✓ Answer: Option (3)

SOLUTION

Explanation: The Exclusive-OR (XOR) gate's defining functional characteristic is outputting True exclusively when input states do not match (inequality detector).

Step-by-step:

Construct the truth table for inputs A and B. "Inputs are different" means $A=0, B=1$ OR $A=1, B=0$.

We want the Output (Y) to be 1 (High) only in these scenarios.

The Exclusive-OR (XOR) gate truth table is: 0,0 0 0,1 1 1,0 1 1,1 0

It outputs High strictly when the inputs are unequal/different.

Choose the correct answers. Sensors are used to perform the following functions. (a) Control the actions as well as drive the plant directly (b) To measure input signals for feed-forward control (c) To measure process variables for system monitoring, diagnosis and supervisory control (d) To generate control signals

(1) (a) and (b)

(2) ✓ (b) and (c)

(3) (c) and (d)

(4) (d) and (a)

✓ Answer: Option (2)

SOLUTION

Explanation: Sensors are purely passive data-gathering devices. Generating logic is for Controllers, and driving the plant is for Actuators.

Step-by-step:

In a control loop, Sensors act as the "eyes and ears". Their sole purpose is to detect and measure physical variables (temperature, pressure) and input signals (Statements b and c).

Sensors do not generate control logic or signals; that is the job of the Controller (like a PLC or PID).

Therefore, Statement (d) is false.

Sensors do not drive the plant or physically control actions; that is the job of the Actuator (like a motor or valve). Therefore, Statement (a) is false.

Q.78

ELECTRICAL ENGINEERING

PLC is an acronym for _____.

(1) Pre-Logic Controller

(2) ✓ Programmable Logic Controller

(3) Programmable Logic Communication

(4) Post-Logic Controller

✓ Answer: Option (2)

SOLUTION

Explanation: "Programmable Logic Controller" is the globally standardized expansion of the industrial automation acronym PLC.

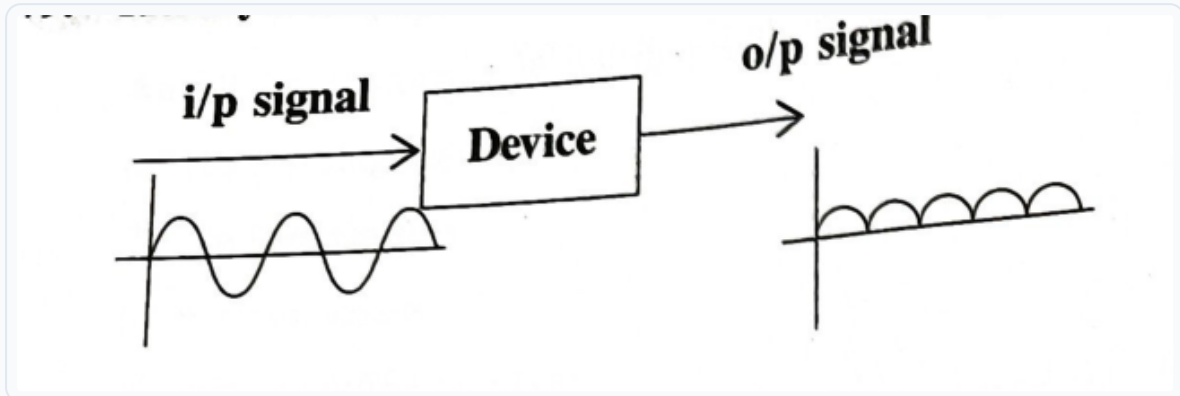
Step-by-step:

In industrial control systems, a ruggedized computer used to automate manufacturing processes (like assembly lines or robotic devices) is required.

This device is called a Programmable Logic Controller.

"Programmable" because its code can be changed, "Logic" because it operates on Boolean and sequential logic operations, and "Controller" because it controls output machinery.

Identify the device used for the following conversion:



(1) Inverter

(2) ✓ Rectifier

(3) Cycloconverter

(4) Chopper

✓ Answer: Option (2)

SOLUTION

Explanation: A Rectifier is the exact electronic device used to convert bi-directional AC into uni-directional pulsating DC.

Step-by-step:

The input waveform is Alternating Current (AC), swinging above and below the zero axis.

The output waveform is Direct Current (DC), with the negative half-cycles flipped to positive (specifically, full-wave rectified DC).

The process of converting AC to DC is called rectification.

Therefore, the device is a Rectifier.

The above figure represents the block diagram for:



(1) Microprocessor

(2) Computer

(3) PLC

(4) ✓ Micro controller

✓ Answer: Option (4)

SOLUTION

Explanation: Integrating a CPU alongside memory, timers, and I/O ports into one unified integrated circuit block defines a Microcontroller.

Step-by-step:

A Microprocessor (Option 1) consists purely of the CPU (ALU + Control Unit) on a single chip. It requires external chips for RAM, ROM, and I/O ports.

A Microcontroller (Option 4) is specifically designed as an entire "computer on a chip." It integrates the CPU, Memory (RAM/ROM), Timers, and I/O ports all onto one single integrated circuit die.

The diagram explicitly shows all these peripheral components packed together inside one single unified block framework.

Section 9: Project Management

Q81 – Q98, Q100

Q.81

PROJECT MANAGEMENT

Complete the following Analogy: Project : Temporary Endeavour :: Operation : _____

(1) ✓ Ongoing work effort

(2) Plan

(3) Risk

(4) Deliverables

✓ Answer: Option (1)

SOLUTION

Explanation: Projects have an end date, whereas Operations are continuous, repetitive daily tasks required to sustain a business.

Step-by-step:

A Project is explicitly defined as a "temporary endeavor undertaken to create a unique product, service, or result." It has a strict start and end date.

An Operation, by contrast, is the day-to-day work required to sustain a business. It is repetitive and continuous (e.g., manufacturing the same car every day, running a help desk).

Therefore, Operation maps to an "Ongoing work effort".

Q.82

PROJECT MANAGEMENT

Who provides guidance as well as direction to the projects?

(1) Manager

(2) Operator

(3) ✓ Consultants

(4) Administrator

✓ Answer: Option (3)

 SOLUTION

Explanation: Consultants act as external subject matter experts, providing specialized strategic direction without managing daily administrative grind.

Step-by-step:

A Project Manager handles the day-to-day execution, administration, and team management. However, high-level guidance, specialized expertise, and strategic direction (often from outside the core execution team) are provided by Consultants or Project Advisors.

Match the following project-based on their classification and select the correct option. List - A: (a) Basis of sector, (b) Basis of ownership, (c) Basis of dependency, (d) Basis of risk involved in project List - B: (i) Private sector project, (ii) High risk project, (iii) Industrial project, (iv) Dependent project Codes:

(1) ✓ a - iii, b - i, c - iv, d - ii

(2) a - iv, b - i, c - iii, d - ii

(3) a - iii, b - ii, c - iv, d - i

(4) a - ii, b - i, c - iv, d - iii

✓ Answer: Option (1)

SOLUTION

Explanation: Logically pairs categories (Sector → Industrial, Ownership → Private, etc.).

Step-by-step:

Basis of sector (a): Defines what industry the project is in. Matches "Industrial project" (iii). (a iii)

Basis of ownership (b): Defines who owns it (Government vs Private). Matches "Private sector project" (i). (b i)

Basis of dependency (c): Defines if the project relies on others. Matches "Dependent project" (iv). (c iv)

Basis of risk (d): Defines the hazard level. Matches "High risk project" (ii). (d ii)

The sequence is a-iii, b-i, c-iv, d-ii.

Q.84

PROJECT MANAGEMENT

One of the misconceptions about project management is _____.

(1) Planning

(2) ✓ Rework

(3) Scheduling

(4) Controlling

✓ Answer: Option (2)

 SOLUTION

Explanation: Rework is a symptom of failure or poor planning; believing it is an expected management phase is a misconception.

Step-by-step:

Planning, Scheduling, and Controlling are the three absolute core pillars of formal Project Management. A common misconception by untrained individuals is that project management involves constant trial-and-error or that "rework" is just a normal phase of getting things done. In reality, effective project management is designed to eliminate rework by planning properly the first time.

Q.85

PROJECT MANAGEMENT

Project work system can be designed by developing and preparing _____.

(1) ✓ Work breakdown system, Project Execution Plan, Project Procedure Manual

(2) Work breakdown system, Advance Action, Project Diary

(3) Work breakdown system, Project Execution Plan, Project Diary

(4) Work breakdown system, Project Execution Plan, Advance Action

✓ Answer: Option (1)

 SOLUTION

Explanation: The WBS, PEP, and PPM form the exact textbook triad required for structuring a project work system.

Step-by-step:

To systematically execute a project, three major documents are designed:

WBS (Work Breakdown Structure): Breaks the project into manageable tasks.

PEP (Project Execution Plan): Outlines how these tasks will be done.

PPM (Project Procedure Manual): Sets the rules, standards, and compliance procedures for doing them.

Q.86**PROJECT MANAGEMENT**

Choose the correct statements for successful project implementation (i) Adequate formulation (ii) Sound project organisation (iii) Proper implementation planning (iv) Advance Action

(1) (i) and (ii) are correct

(2) (i), (ii) and (iii) are correct

(3) (ii) and (iii) are correct

(4) ✓ All are correct

✓ Answer: Option (4)

**SOLUTION**

Explanation: All four represent critical, documented prerequisites for ensuring execution success without bottlenecks.

Step-by-step:

Adequate formulation: A well-defined scope is mandatory.

Sound project organization: A good team hierarchy is mandatory.

Proper planning: WBS and scheduling are mandatory.

Advance Action: Securing permits, initial funding, or long-lead materials before the official start prevents bottlenecks and is highly recommended.

Q.87**PROJECT MANAGEMENT**

In any project, who will maintain project diary?

(1) Financier

(2) Administrator

(3) ✓ Project Manager

(4) Accountant

✓ Answer: Option (3)

**SOLUTION**

Explanation: Tracking and logging daily physical project health on-site is a core operational duty of the Project Manager.

Step-by-step:

A Project Diary (or project log) records daily occurrences, weather conditions, disputes, progress, and site conditions.

The person on the ground responsible for overseeing the daily execution and ensuring all events are legally and practically recorded is the Project Manager (or site manager acting on their behalf).

Match the following and choose the correct answer. List - I: (a) Initial project team, (b) Core project team, (c) Project Advisors, (d) Project stakeholders List - II: (i) People who invested in the project, (ii) Group of people who give feedback and counselling, (iii) Specific people who initially conceive the idea, (iv) Group of people who are ultimately responsible for designing and managing project Codes:

(1) a - ii, b - iii, c - i, d - iv

(2) a - ii, b - iii, c - iv, d - i

(3) ✓ a - iii, b - iv, c - ii, d - i

(4) a - i, b - iii, c - iv, d - ii

✓ Answer: Option (3)

SOLUTION

Explanation: Maps organizational roles perfectly to their standard textbook PM definitions.

Step-by-step:

Initial project team (a): The pioneers who conceive the idea before it's fully funded (iii). (a iii)

Core project team (b): The people officially hired to design, execute, and manage the project (iv). (b iv)

Project Advisors (c): Experts who provide feedback and counseling (ii). (c ii)

Project stakeholders (d): Anyone with an interest, especially those who invested in it (i). (d i)

The sequence is a-iii, b-iv, c-ii, d-i.

Q.89

PROJECT MANAGEMENT

Decision tree analysis in project management is used to evaluate _____ outcomes

(1) ✓ Uncertainty

(2) Certainty

(3) Both (1) & (2)

(4) None of the above

✓ Answer: Option (1)

 SOLUTION

Explanation: Because it relies on percentage probability models, decision tree analysis is strictly used for events characterized by uncertainty.

Step-by-step:

A Decision Tree is a flowchart-like diagram used to evaluate different courses of action.

Each branch represents a possible outcome, assigned a probability percentage and a financial impact.

Because probabilities are involved, decision trees are strictly used when the future is unknown—i.e., evaluating Uncertainty. If an outcome was certain, you wouldn't need a probability tree.

Q.90

PROJECT MANAGEMENT

What does the letter 'C' stand for in CPM?

(1) Crash

(2) ✓ Critical

(3) Cost

(4) Control

✓ Answer: Option (2)

 SOLUTION

Explanation: CPM stands for Critical Path Method.

Step-by-step:

CPM is the most widely used mathematical algorithm for scheduling a set of project activities.

It stands for Critical Path Method.

In a network diagram, critical path is defined as _____

(1) ✓ Longest sequence of dependent activities with shortest project duration

(2) Longest sequence of dependent activities with longest project duration

(3) Shortest sequence of dependent activities with shortest project duration

(4) Shortest sequence of dependent activities with longest project duration

✓ Answer: Option (1)

SOLUTION

Explanation: The physical "longest" continuous path mathematically bounds the minimum (shortest possible) completion time of the entire project.

Step-by-step:

To finish a project, all paths in the network diagram must be completed.

The path that takes the maximum amount of time (the longest sequence) dictates the timeline of the whole project. You cannot finish earlier than your longest path allows.

Therefore, this longest path determines the shortest possible duration in which the entire project can be successfully completed.

Match the project plan with the List. List - I: (a) Resource plan, (b) Financial plan, (c) Quality plan, (d) Risk plan List - II: (i) Human risk, (ii) Customer requirements, (iii) Labour cost, (iv) Type of labour Codes:

(1) a - i, b - ii, c - iii, d - iv

(2) a - ii, b - i, c - iv, d - iii

(3) ✓ a - iv, b - iii, c - ii, d - i

(4) a - iii, b - iv, c - i, d - ii

✓ Answer: Option (3)

SOLUTION

Explanation: Pairs each specific management domain to its corresponding operational tracking metric.

Step-by-step:

Resource plan (a): Deals with personnel and equipment. Matches "Type of labour" (iv). (a iv)

Financial plan (b): Deals with budgets. Matches "Labour cost" (iii). (b iii)

Quality plan (c): Ensures the product meets specifications. Matches "Customer requirements" (ii). (c ii)

Risk plan (d): Deals with hazards and uncertainties. Matches "Human risk" (safety/turnover) (i). (d i)

The sequence is a-iv, b-iii, c-ii, d-i.

Q.93

PROJECT MANAGEMENT

Project planning involves

(1) Formal planning only

(2) Informal planning only

(3) ✓ Both (1) and (2)

(4) Neither (1) nor (2)

✓ Answer: Option (3)

 SOLUTION

Explanation: A successful project relies on documented plans (formal) balanced with agile, ad-hoc team coordination (informal).

Step-by-step:

Formal planning includes documented schedules, WBS, budgeted baselines, and risk registers.

Informal planning includes hallway conversations, rapid whiteboarding sessions, and daily ad-hoc problem solving by the team.

Successful projects require a blend of both; formal plans provide the structure, informal plans provide agility.

Q.94

PROJECT MANAGEMENT

Complex projects: Linear programming :: Large scale scheduling: _____

(1) Bar chart

(2) Network technique

(3) Gantt chart

(4) ✓ Heuristic programming

✓ Answer: Option (4)

 SOLUTION

Explanation: Exact math takes too long for large-scale constraint scheduling, so heuristic (approximate) programming algorithms are used.

Step-by-step:

Linear programming provides mathematical optimization for complex, multi-constraint problems.

For "Large scale scheduling" where resources are heavily constrained, mathematically calculating the perfect optimal schedule (using exact algorithms) takes too long (NP-hard problem).

Therefore, software uses Heuristic programming (rules of thumb / educated algorithms) to find a "good enough" workable schedule quickly.

Given List - I & List - II, match the following List - I: (a) Gantt chart, (b) Network technique, (c) Project design, (d) Time Estimate List - II: (i) Fix/set time target, (ii) Estimate time, (iii) Interrelation activities, (iv) Blue print for action-oriented activity Codes:

(1) a - iii, b - ii, c - iv, d - i

(2) ✓ a - ii, b - iii, c - iv, d - i

(3) a - iii, b - ii, c - i, d - iv

(4) a - ii, b - iii, c - i, d - iv

✓ Answer: Option (2)

SOLUTION

Explanation: Network technique maps interrelations; design is the blueprint; estimating time targets it; Gantt visually tracks it.

Step-by-step:

Network technique (b): Maps out predecessor/successor logic. Matches "Interrelation activities" (iii). (b iii)

Project design (c): The overall plan. Matches "Blue print for action-oriented activity" (iv). (c iv)

Looking at (a) and (d) between (i) and (ii):

Time Estimate (d): The act of determining duration fixes/sets the target. (d i)

Gantt chart (a): Visually represents the estimated time on a calendar. (a ii).

Sequence: a-ii, b-iii, c-iv, d-i.

Q.96**PROJECT MANAGEMENT**

Methodologies involved in planning is/are (i) Planning by incentive (ii) Planning by direction

(1) (i) Only

(2) (ii) Only

(3) ✓ (i) and (ii)

(4) neither (i) nor (ii)

✓ Answer: Option (3)

 SOLUTION

Explanation: Both top-down direction and bottom-up incentives are recognized organizational management strategies.

Step-by-step:

Planning by direction: A top-down approach where managers dictate exactly what, when, and how tasks will be done.

Planning by incentive: A participative approach where teams are given goals and financial/recognition incentives to figure out the best way to achieve the plan themselves.

Both are established methodologies taught in industrial management.

Q.97**PROJECT MANAGEMENT**

An audit of a project after it has been commissioned is known as _____

(1) Performance evaluation

(2) Abandonment analysis

(3) ✓ Post-audit

(4) Initial review

✓ Answer: Option (3)

 SOLUTION

Explanation: "Post" designates an audit done after the final commissioning phase is officially handed over.

Step-by-step:

"Commissioning" is the act of turning the finished project (like a power plant) on and handing it over to the owner.

Any audit conducted after this phase is completed is logically referred to as a Post-audit (or Post-Implementation Review).

It aims to see if the project actually delivered the promised ROI.

Q.98

PROJECT MANAGEMENT

Which network technique is suitable for uncertain projects?

(1) Construction network

(2) ✓ PERT

(3) CPM

(4) Milestone chart

✓ Answer: Option (2)

 SOLUTION

Explanation: PERT utilizes three probabilistic time estimates to specifically handle highly uncertain, non-repetitive task lengths.

Step-by-step:

CPM (Critical Path Method) uses a single, deterministic time estimate for each task. It is used for certain, repetitive projects (like building a house).

PERT (Program Evaluation and Review Technique) uses three probabilistic time estimates (Optimistic, Pessimistic, Most Likely). It was designed by the US Navy for R&D projects where task durations are highly uncertain.

Section 10: IoT

Q99

Q.99

IOT

Match the following and select the correct answer List - I: (a) IOT, (b) Augmented reality, (c) Cloud technology List - II: (i) Gmail account, (ii) Smart farming, (iii) Gaming Codes:

(1) ✓ a - ii, b - iii, c - i

(2) a - ii, b - i, c - iii

(3) a - i, b - ii, c - iii

(4) a - iii, b - ii, c - i

✓ Answer: Option (1)

SOLUTION

Explanation: IOT physically connects sensors to internet (Smart farming). Augmented reality is heavy in Gaming. Cloud hosts web SaaS like Gmail.

Step-by-step:

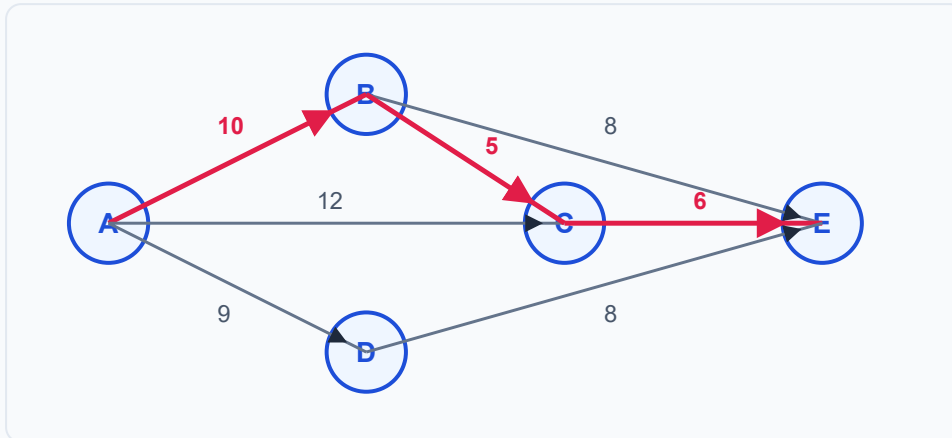
IOT (Internet of Things) (a): Connecting physical sensors to the internet. Matches "Smart farming" (ii), where soil sensors automate irrigation. (a ii)

Augmented reality (b): Overlaying digital images on the real world. Heavily used in "Gaming" (iii) (e.g., Pokemon Go). (b iii)

Cloud technology (c): Remote servers hosting applications. "Gmail account" (i) is a primary SaaS cloud example. (c i)

Sequence: a-ii, b-iii, c-i.

The critical path in the CPM network diagram shown below is:



(1) A - B - E

(2) ✓ A - B - C - E

(3) A - D - E

(4) A - C - E

✓ Answer: Option (2)

SOLUTION

Explanation: The critical path is defined as the path yielding the highest numerical duration sum.

Step-by-step:

The critical path is defined as the path with the longest total duration.

Trace all possible routes from Start (A) to Finish (E) following the directional arrows:

Path 1: A B E = $10 + 8 = 18$

Path 2: A B C E = $10 + 5 + 6 = 21$

Path 3: A C E = $12 + 6 = 18$

Path 4: A D E = $9 + 8 = 17$ (Note: There is no arrow from C to B, only B to C, so Option 4 is physically impossible).

The highest total duration is 21.

Answer Key

Quick Reference – All 100 Questions

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

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