DCET 2025 - Question Paper & Solutions

1. Choose the correct answer from the following:

a) Every identity matrix is a scalar matrix

b) Every scalar matrix is an identity matrix

c) Every diagonal matrix is an identity matrix

d) A square matrix whose each element is one is an identity matrix.

Ans : (a)

An idendity matrix has 1's on the primary diagonal and all the other elements are zero.

A scalar matrix is a diagonal matrix where all diagonal elements are equal (not necessarily 1). So, an identity matrix is a scalar matrix where the scalar is 1.

2. The value of $\begin{vmatrix} 3 & 1 & -9 \\ -1 & 2 & 3 \\ 2 & 1 & -6 \end{vmatrix}$ **is**

a) 45 b) 90

c) 0 d) –45

Ans : (c)

$$\begin{vmatrix} 3 & 1 & -9 \\ -1 & 2 & 3 \\ 2 & 1 & -6 \end{vmatrix} = 3\begin{vmatrix} 2 & 3 \\ 1 & -6 \end{vmatrix} - 1\begin{vmatrix} -1 & 3 \\ 2 & -6 \end{vmatrix} + (-9)\begin{vmatrix} -1 & 2 \\ 2 & 1 \end{vmatrix}$$

$$= 3(-12-3) - 1(6-6) - 9(-1-4)$$
$$= 3(-15) - 1(0) - 9(-5)$$
$$= -45 - 0 + 45 = 0$$

3. The characteristic equation of $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ **is**

a) $\lambda^2 - 3\lambda - 2 = 0$

b) $\lambda^2 - 5\lambda + 10 = 0$

c) $\lambda^2 - 5\lambda - 2 = 0$

d) $\lambda^2 + 3\lambda + 10 = 0$

Ans : (b)

$$|A - \lambda I| = 0$$

$$\begin{vmatrix} (1-\lambda) & -2 \\ 3 & (4-\lambda) \end{vmatrix} = 0$$

$$(1-\lambda)(4-\lambda) - [(3)(-2)] = 0$$
$$4 - \lambda - 4\lambda + \lambda^2 + 6 = 0$$
$$\lambda^2 - 5\lambda + 10 = 0$$

4. If $|A|\,I = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$**, then** $A.\text{adj}\,A$ **is equal to __**

a) $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$ b) $\begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$

Ans : (d)

- For any square matrix A, the identity matrix I: $A.\text{adj}(A) = |A|\,I$ is always true.

$$\therefore |A|\,I = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$$

Here $A.\text{adj}(A) = |A|\,I = \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$

5. The slope of the straight line joining two points (3, – 4) and (–1, 5) is

a) 4/9 b) – 4/9

c) –1/4 d) – 9/4

Ans : (d)

- Slope of straight line, $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$(3, -4) = (x_1, y_1)$

$(-1, 5) = (x_2, y_2)$

$$m = \frac{5-(-4)}{-1-3} = \frac{5+4}{-4} = \frac{9}{-4} = \frac{-9}{4}$$

6. The angle of inclination of the straight line is π/4 and y-intercept is 3, then equation of the straight line is

a) $y = x + 3$ b) $y = x - 3$

c) $y = -x - 3$ d) $y = -x + 3$

Ans : (a)

- Inclination, $\theta = \frac{\pi}{4}$ rad $\quad | \pi = 180°$

$\theta = 45°$

y - intercept, $c = 3$

slope, $m = \tan\theta$

$m = \tan 45° = 1$

slope – intercept form

$y = mx + c$

$y = 1x + 3$

$y = x + 3$

7. The equation of straight line passing through (–5, 4) and parallel to *X*-axis is _____

a) $x - y + 9 = 0$ b) $x + 5 = 0$

c) $x + y + 1 = 0$ d) $y - 4 = 0$

Ans : (d)

- The slope of a line parallel to x-axis is zero.

$\therefore$ m = 0 and line passing through the point $(x_1, y_1) = (-5, 4)$

Slope - point form

$(y - y_1) = m\,(x - x_1)$

$y - 4 = 0\,(x - (-5))$

$y - 4 = 0$

8. What is the equation of the straight line passing through the points (1, 5) and (3, 2)?

a) $7x - 4y + 13 = 0$ b) $3x + 2y - 17 = 0$

c) $3x + 2y - 13 = 0$ d) $3x + 2y + 13 = 0$

Ans : (c)

- Two points given

$(1, 5) = (x_1, y_1)$ and $(3, 2) = (x_2, y_2)$

$$\text{Slope, } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-5}{3-1} = \frac{-3}{2}$$

$\therefore$ slope, $m = \frac{-3}{2}$ and point $(1, 5)$

$(y - y_1) = m(x - x_1)$

$(y - 5) = \frac{-3}{2}(x - 1)$

$2(y - 5) = -3\,(x - 1)$

$3x + 2y - 13 = 0$

9. The ramp in front of a gate is elevated by an angle of π/3 radians, then the angle in degrees is _____

a) 15° b) 75°

c) 60° d) 30°

Ans : (c)

- The angle of elevation is $\frac{\pi}{3}$ radians

$$\text{Degrees} = \text{Radians} \times \frac{180}{\pi}$$

$$= \frac{\pi}{3} \times \frac{180}{\pi}$$

$= 60°$

10. If $\sin(90 - \theta) + \cos\theta = \sqrt{2}\ \cos(90 - \theta)$, then the value of $\text{cosec}\theta$ is _____.

a) $\frac{\sqrt{3}}{2}$ b) $\sqrt{\frac{3}{2}}$

c) $\sqrt{\frac{2}{3}}$ d) $\sqrt{3}$

Ans : (b)

- $\sin(90 - \theta) + \cos\theta = \sqrt{2}\ \cos(90 - \theta)$

$\cos\theta + \cos\theta = \sqrt{2}\ \sin\theta \quad | \quad \sin(90° - \theta) = \cos\theta$

$2\cos\theta = \sqrt{2}\ \sin\theta \quad | \quad \cos(90° - \theta) = \sin\theta$

$$\frac{2}{\sqrt{2}} = \frac{\sin\theta}{\cos\theta}$$

$$\frac{2}{\sqrt{2}} = \tan\theta$$

$$\therefore \tan\theta = \frac{2}{\sqrt{2}} = \frac{\sqrt{2}\times\sqrt{2}}{\sqrt{2}} = \sqrt{2}$$

W.K.T.

$$\tan\theta = \frac{\text{Opp}}{\text{Adj}} = \frac{\sqrt{2}}{1}$$

$Hyp^2 = Opp^2 + Adj^2$

$Hyp^2 = \left(\sqrt{2}\right)^2 + 12$

$Hyp^2 = 2 + 1$

$Hyp = \sqrt{3}$

$\therefore \operatorname{cosec}\theta = \dfrac{Hyp}{Opp}$

$= \dfrac{\sqrt{3}}{\sqrt{2}} = \sqrt{\dfrac{3}{2}}$

11. If *A*, *B*, *C* are the angles of a trinagle, then the incorrect relation is _____

a) $\sin\left(\frac{A+B}{2}\right) = \cos\left(\frac{c}{2}\right)$

b) $\cos\left(\frac{A+B}{2}\right) = \sin\left(\frac{c}{2}\right)$

c) $\tan\left(\frac{A+B}{2}\right) = \sin\left(\frac{c}{2}\right)$

d) $\cot\left(\frac{A+B}{2}\right) = \tan\left(\frac{c}{2}\right)$

Ans : (c)

- Since, $\angle A + \angle B + \angle C = 180^\circ$

  $A + B = 180^\circ - C$

  According complementary angles

$$\sin\left(\frac{A+B}{2}\right) = \cos\left(\frac{C}{2}\right)$$

$$\cos\left(\frac{A+B}{2}\right) = \sin\left(\frac{C}{2}\right)$$

$$\cot\left(\frac{A+B}{2}\right) = Tan\left(\frac{C}{2}\right)$$

But $\tan\left(\frac{A+B}{2}\right) \neq \sin\left(\frac{C}{2}\right)$

$\therefore$ 3 option is incorrection relation.

12. The value of sin40° + sin20° is _____

a) $\sqrt{3}\cos 10^\circ$

b) $\sqrt{3}\cos 20^\circ$

c) $\cos 10^\circ$

d) $\sqrt{2}\cos 10^\circ$

Ans : (c)

$$\begin{aligned}
&= \sin 40^\circ + \sin 20^\circ \\
\sin C + \sin D &= 2\sin\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right) \\
&= 2.\sin\left(\frac{40+20}{2}\right)\cos\left(\frac{40-20}{2}\right) \\
&= 2.\sin 30^\circ . \cos 10^\circ \\
&= 2\times\frac{1}{2}\times\cos 10^\circ \\
&= \cos 10^\circ
\end{aligned}$$

13. The derivative of $y = \dfrac{1+x}{1-x}$ is _____

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

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

Ans : (a)

$$y = \frac{1+x}{1-x} = \frac{x+1}{-x+1} = \frac{1x+1}{-1x+1} = \frac{a\,f(x)+b}{c\,f(x)+c}$$

using shortcut

$$\frac{dy}{dx} = \frac{(ad-bc)(f'(x))}{(\text{Denominator})^2}$$

$$\frac{dy}{dx} = \frac{[(1\times1)-(1\times-1)](1)}{(1-x)^2}$$

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

14. If $y = \log\left(\sqrt{\tan}\ x\right)$, then the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is _____

a) ∞ b) 1 c) 0 d) 1/2

Ans : (b)

$$y = \log\left(\sqrt{\tan x}\right)$$

diff. $\log x \Rightarrow \frac{1}{x}$

diff. $\sqrt{x} \Rightarrow \frac{1}{2\sqrt{x}}$

diff. $\tan x \Rightarrow \sec^2 x$

$$\frac{dy}{dx} = \frac{1}{\sqrt{\tan x}} \times \frac{1}{2\sqrt{\tan x}} \times \sec^2 x$$

$$= \frac{\sec^2 x}{2\tan x}$$

$$= \frac{\sec^2 45^\circ}{2\tan 45^\circ} \quad \Big| \quad \text{at } x = \frac{\pi}{4}$$

$$= \frac{\left(\sqrt{2}\right)^2}{2(1)} = \frac{2}{2} = 1 \quad \Big| \quad x = 45^\circ$$

15. If $y = (2 + 3\log x)^{10}$, then $\frac{dy}{dx}$ at $x = 1$ is ____

a) $15\,(2^9)$ b) $(15 \times 2)^{10}$

c) $15\,(2^{10})$ d) $10\,(5^9)$

Ans : (c)

$$y = (2+3\log x)^{10}$$

$$\frac{dy}{dx} = 10\times(2+3\log x)^9 \times \left(0+3\frac{1}{x}\right)$$

$$= 10\times(2+3\log x)^9 \times \left(\frac{3}{x}\right)$$

$$= \frac{30}{x}(2+3\log x)^9$$

at $x = 1$ $= \frac{30}{1}(2+3\log 1)^9$ $\quad |\ \log 1 = 0$

$$= 30(2+3(0))^9$$

$$= 30(2)^9$$

$$= 15\times2\times2^9$$

$$= 15\times2^{10} = 15\,(2^{10})$$

16. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ = _____

a) $\cos x/(2y-1)$ b) $\cos x/(1-2y)$

c) $\sin x/(2y-1)$ d) $\sin x/(1-2y)$

Ans : (a)

$$y = \sqrt{\sin x + y}$$

sq. on both side

$$y^2 = \sin x + y$$

diff.

$$2y\times\frac{dy}{dx} = \cos x + \frac{dy}{dx}$$

$$2y\cdot\frac{dy}{dx} - \frac{dy}{dx} = \cos x$$

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

17. $\int \cot^2 x\,dx$ = _____

a) $-\cot x - x + c$

b) $\cot x - x + c$

c) $\tan x - x + c$

d) $\tan^2 x + c$

Ans : (a)

$\int \cot^2 x\,dx$ | $\cot^2 x = \operatorname{cosec}^2 x - 1$

$\int \left(\operatorname{cosec}^2 x - 1\right) dx$

$\int \operatorname{cosec}^2 x\,dx - \int 1\,dx$

$= -\cot x - x + c$

18. The value of $\int_0^{\frac{\pi}{4}} \frac{\sec^2 x}{1+\tan x}\,dx$ is _____

a) $\log 2 + 1$ b) $\log 1$

c) $\log 2$ d) $\log 2 - 1$

Ans : (c)

$\int_0^{\frac{\pi}{4}} \frac{\sec^2 x}{1+\tan x}\,dx$

Using:- $\int \frac{f'(x)}{f(x)}dx = \log(f(x))$

$f(x) = 1 + \tan x, \quad f'(x) = \sec^2 x$

$\left[\log(1+\tan x)\right]_0^{\pi/4}$ | $\frac{\pi}{4} = 45°$

Upper Limit (UL) $\log(1+\tan 45°) = \log 2$

Lower Limit (LL) $\log(1+\tan 0°) = \log 1$

$\therefore$ UL – LL = log 2 – log 1 | log 1 = 0

= log 2

19. $\int \sqrt{1+\cos 2x}\,dx$ is _____

a) $2\cos x + c$ b) $2\sin x + c$

c) $\sqrt{2}\cos x + c$ d) $\sqrt{2}\sin x + c$

Ans : (d)

$\int \sqrt{1+\cos 2x}\,dx$ | $1+\cos 2x = 2\cos^2 x$

$\int \sqrt{2\cos^2 x}\,dx$

$\int \sqrt{2}\,(\cos x)\,dx$

$= \sqrt{2}\int \cos x\,dx$

$= \sqrt{2}\sin x + c$

20. The value of $\int_0^{\frac{\pi}{4}} \sin x \cos x\,dx$ is _____

a) –1/4 b) 1/4

c) π/2 d) π/4

Ans : (b)

$\int f(x).f'(x)dx = \frac{(f(x))^2}{2}$

$f(x) = \sin x, \quad f'(x) = \cos x$

$\left[\left(\frac{(\sin x)^2}{2}\right)\right]_0^{\pi/4}$ | $\frac{\pi}{4} = 45°$

Upper Limit (UL) $\frac{(\sin 45°)^2}{2} = \frac{\left(\frac{1}{\sqrt{2}}\right)^2}{2} = \frac{1}{2}\times\frac{1}{2} = \frac{1}{4}$

Lower Limit (LL) $\frac{(\sin 0)^2}{2} = 0$

$\therefore$ UL – LL $= \frac{1}{4} - 0$

$= \frac{1}{4}$

21. The data extracted from the google forms has the file extension as

a) .doc b) .docx

c) .csv d) .xlsx

Ans : (c)

The data extracted from the google forms has the extension as .csv

22. Match the following with respect to the classification of data and data collection.

a)	**Data**	**i) Survey**
b)	**Questionnaire**	**ii) Number of students appearing for exam**
c)	**Interview**	**iii) Google form**
d)	**Quantitative data**	**iv) Facts and figure**

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

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

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

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

Ans : (c)

a) Collection of facts and figures is called data

b) Questionnaise can be prepared by using google form

c) Collection of data through interview is one of the method of survey

d) The data which can be numerically mensurable is called quantitative data

Ex:- Number of students appearing for exam

23. Data cleaning refers to

a) Modifying the gathered data

b) Adding data to the gathered data

c) Removing the data from gathered data

d) Processing the data according to the defined problem statement.

Ans : (a / b / c / d)

Objectives of data cleaning is

1) Modifying the gathered data
2) Adding data to the gathered data
3) Removing the data from the gathered data
4) Processing the data according to the defined problem statement.

24. The syntax to find frequency distribution in an interval in excel is

a) = COUNTIFS (criteria_range 1, criteria l, ...)

b) = COUNTIF (criteria_range l, criteria l, ...)

c) = COUNT (criteria_range l, criteria l, ...)

d) = COUNTIFS (criteria 1, criteria 2, ...)

Ans : (a)

The syntax to find frequency distribution in an interval in excel is

= COUNTIFS (criteria_range l, criteria l, ...)

25. Which tab in Excel supports in plotting Piechart?

a) Home tab b) View tab

c) Insert tab d) Data tab

Ans : (c)

We can plot pie-chart of a data in excel using tab called insert

26. Frequency polygon is a ____ graph

a) Scatter graph b) Pie graph

c) Bar graph d) Line graph

Ans : (d)

Frequency polygon is a line graph.

27. Which of the following statements on Histogram is true?

a) A Histogram can display categorical data effectively.

b) The bars in a Histogram should not touch each other.

c) A Histogram shows the frequency distribution of continuous data

d) A Histogram is same as a bar chart

Ans : (c)

Histogram can be constructed for continuous frequency distribution.

28. Choose the right steam-leaf plot from the following plots for the data set.

52, 20, 44, 28, 20, 41, 30, 56, 32, 28

Plot-1:

Stem	Leaf
2	0088
3	20
4	14
5	26

Plot-2:

Stem	Leaf
2	0088
3	02
4	14
5	26

Plot-3:

Stem	Leaf
2	08
3	20
4	14
5	26

Plot-4:

Stem	Leaf
2	80
3	20
4	41
5	62

a) Plot - 1 b) Plot - 2

c) Plot - 3 d) Plot - 4

Ans : (b)

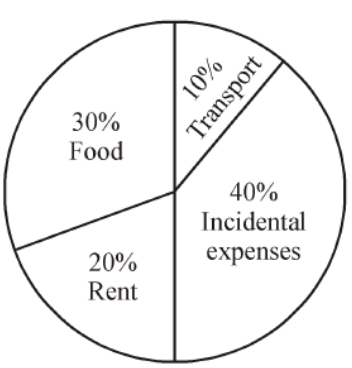
Arrange the data in ascending order

20, 20, 28, 28, 30, 32, 41, 44, 52, 56

Stem	Leaf
2	0088
3	02
4	14
5	26

Key : 2/0 = 20

29. The below chart represents the expenditure of a person in a month. If his salary is ₹50,000 what is his total expenditure on rent and transport?



a) ₹ 30,000 b) ₹ 25,000

c) ₹ 15,000 d) ₹ 10,000

Ans : (c)

Total expenditure = 50000

Rent and transport = 20% + 10% = 30%

∴ Total expenditure on rent and transport is

$$= \frac{50000}{100} \times 30 = 15000$$

30. For the data set given below, match the values of statistical parameters.

i) Range	**a) 58**
ii) Mean	**b) 44**
iii) Mode	**c) 48.4545**
iv) Median	**d) 48**

Dataset : 28, 36, 44, 58, 44, 33, 76, 59, 58, 39, 58.

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

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

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

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

Ans : (b)

1) Range = H – L = 76 – 28

= 48

2) Mean = $\overline{X} = \frac{\Sigma X}{n}$

$$= \frac{28+36+44+58+44+33+76+59+58+39+58}{11}$$

$$= \frac{533}{11}$$

Mean = 48.4545

3) Most frequently occuring value in a data is 58

∴ Mode = 58

4) Arrange the data in order

28, 33, 36, 39, 44, **44**, 58, 58, 58, 59, 76

The middle most value is 44

∴ Median = 44

31. The Excel syntax for finding quartile 4 (4th quartile) for a given data set is

a) = QUARTILE [array, 4]
b) = QUARTILE (array, 4)
c) = QUARTILE (array_4)
d) = QUARTILE (array-4)

Ans : (b)

The excel syntax for finding quartile 4 (4th quartile) for a given data set is

= QUARTILE (array, 4)

32. Which of the following equalities and inequalities is true for the data set 25, 25, 25, 25, 25, 25, 25, 25, 25?

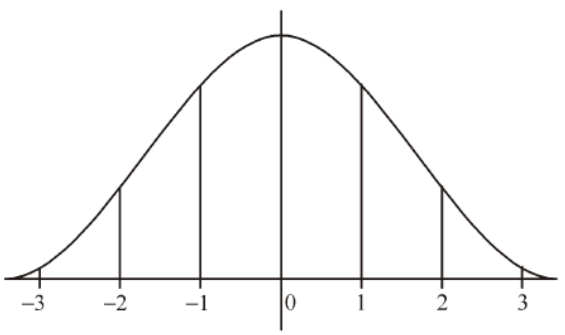
a) Variance > Standard deviation
b) Variance = Standard deviation
c) Variance < Standard deviation
d) Variance < 0, Standard deviation < 0

Ans : (b)

If all the observations are same then variance and S.D are equal

$\therefore$ Variance = S.D = 0

33. Skewness of the distribution shown below is



a) > 0 b) = 0
c) < 0 d) = 1

Ans : (b)

The above diagram is symmetric distribution.

In symmetric distribution skewnes is zero ($\beta_1 = 0$)

34. If the Kurtosis = 3, then the data distribution is called

a) Leptokurtic b) Mesokurtic
c) Platykurtic d) Skewkurtic

Ans : (b)

If Kurtosis = 3 ($\beta_2 = 3$)

Then the given distribution is mesokurtic.

35. Assertion (A) : An "int" type data in Python can store floating point numbers.

Reasoning (R) : Python "int" type only stores positive integers.

a) A is true, R is false
b) A is false, R is true
c) A is false, R is false
d) A is true, R is true

Ans : (c)

Assertion (A): An "int" type data in Python can store floating point numbers.

In Python, the `int` data type is used to store whole numbers (integers), both positive and negative, and zero. It **cannot** store floating-point numbers (numbers with a decimal point). Floating-point numbers are stored using the `float` data type.

Therefore, Assertion (A) is **false**.

Reasoning (R): Python "int" type only stores positive integers.

Python's `int` type can store positive integers, negative integers, and zero. For example, `5`, `-10`, and `0` are all valid `int` values.

36. Match the following data types:

a) a = 5	**i) string**
b) a or b	**ii) float**
c) "Hello KEA"	**iii) Integer**
d) C = 5.9	**iv) Boolean**

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

Ans : (a)

a = 5

- This is a whole number without a decimal.
- In Python, this is of type **int → (iii) Integer**

b = a or b

- The expression a or b performs a **logical OR** operation.
- In Python, or returns the **first truth value**, and the result is typically **interpreted as a Boolean context**.
- For the sake of data type matching, **a or b** falls under **Boolean logic → (iv) Boolean**

c = "Hello KEA"

- Text enclosed in quotes ("") is a **string → (i) string**

d = 5.9

- A number with a decimal point is of type **float** in Python → **(ii) float**

Therefore, the correct matches are:

- a → iii (Integer)
- b → iv (Boolean)
- c → i (String)
- d → ii (Float)

37. What is the syntax to assign the data type to a variable in Python?

a) Name = "hello world"

b) Height = 5.9

c) Assertion = True

d) All of the above

Ans : (d)

In Python, **data types are assigned automatically based on the value** you assign to a variable. This is known as **dynamic typing**.

a) `Name = "hello world"`

- `"hello world"` is a **string** (text).
- So `Name` becomes a **string** type variable.

b) `Height = 5.9`

- `5.9` is a **floating-point number**.
- So `Height` becomes a **float**.

c) `Assertion = True`

- `True` is a **Boolean** value.
- So `Assertion` becomes a **bool**.
- All three assignments correctly assign a variable along with its appropriate data type based on the value.

Hence, the correct answer is:

(D) All of the above

38. Which of the following is a valid variable name in Python?

a) 1 Var b) Var_name

c) Var - name d) Var name

Ans : (b)

Rules for Valid Python Variable Names:

1. **Must start with a letter** (A–Z or a–z) or an underscore _
2. **Cannot start with a digit**
3. **Can contain letters, digits, and underscores only**
4. **Cannot contain spaces or special characters** like -, @, #, etc.
5. **Cannot be a Python keyword** (like if, while, etc.)

Let's analyze the invalid options:

a) 1 Var

✗ Invalid: Starts with a number and contains a space

c) Var - name

✗ Invalid: Contains a minus - symbol, which is not allowed

d) Var name

✗ Invalid: Contains a space

Valid Option:

b) Var_name

✓ Starts with a letter

✓ Contains only letters and underscore

✓ No spaces or invalid symbols

39. The output of the following Python program is

```
n = 5
A = 0
while (n > 0) :
        A = A + n
        n = n – 1
print (A)
```

a) 15 b) 5

c) 55 d) 0

Ans : (a)

We are adding `n` to `A` repeatedly while `n > 0`, and decreasing `n` by 1 each time.

Initial Values:

- `n = 5`
- `A = 0`

Loop Execution:

1. `n = 5` → `A = 0 + 5 = 5`, then `n = 4`
2. `n = 4` → `A = 5 + 4 = 9`, then `n = 3`
3. `n = 3` → `A = 9 + 3 = 12`, then `n = 2`
4. `n = 2` → `A = 12 + 2 = 14`, then `n = 1`
5. `n = 1` → `A = 14 + 1 = 15`, then `n = 0`

Now n is 0, so the loop stops.

40. Which of the following is the correct syntax of an if statement in Python?

a) if $x > 0$ then: b) if $(x > 10)$

c) if $x > 10$: d) if $x > 10$;

Ans : (c)

Syntax of if Statement in Python

Python uses a **simple and clean syntax** for conditional statements:

if condition:

Key points:

- The **if keyword** is followed by a **condition**.
- The **condition does not need parentheses** (unlike languages like C or Java).
- It **must end with a colon:**

41. Consider the following algorithms:

Step 1 : $A = 5$, $B = 3$

Step 2 : if $A > B$, then $A = A - B$

Step 3 : $B = A + B$

Step 4 : Output B

What is the output?

a) 2 b) 5

c) 8 d) 3

Ans : (b)

Let's go step-by-step again clearly:

Step 1:

- `A = 5`
- `B = 3`

Step 2:

- Is `A > B`? Yes → `5 > 3`
- Then: `A = A - B = 5 - 3 = 2`

Now:

- `A = 2`
- `B = 3`

Step 3:

- `B = A + B = 2 + 3 = 5`

Step 4:

- Output `B` → **5**

42. Which of the following best defines an algorithm?

a) A graphical representation

b) A code snippet

c) A step-by-step procedure to solve a problem

d) A mobile application

Ans : (c)

An **algorithm** is:

A finite sequence of well-defined steps or instructions used to solve a problem or perform a task.

43. Consider the following algorithm:

Start

if $a <= b$ and $a <= c$

print *a*

else if *b* < = *a* and *b* < = *c*

print *b*

else

print *c*

End.

if *a* = 10, *b* = 25, *c* = 33

What output will be printed for the above algorithm?

a) 25 b) 10

c) 33 d) None of the above

Ans : (b)

Algorithm Logic:

We are given:

- `a = 10`
- `b = 25`
- `c = 33`

Condition 1: `if a <= b and a <= c`

Substitute values:

- `10 <= 25` → True
- `10 <= 33` → True

Since **both conditions are true**, this block is executed:

So, **`10` is printed** and the rest of the conditions (`else if`, `else`) are skipped.

44. Consider the following algorithm:

if num > 0

num = num + 10

print num

else if num == 0

num = num * 10

print num

else

print num.

What will be the output, if num = –5?

a) 50 b) –50

c) –5 d) 5

Ans : (b)

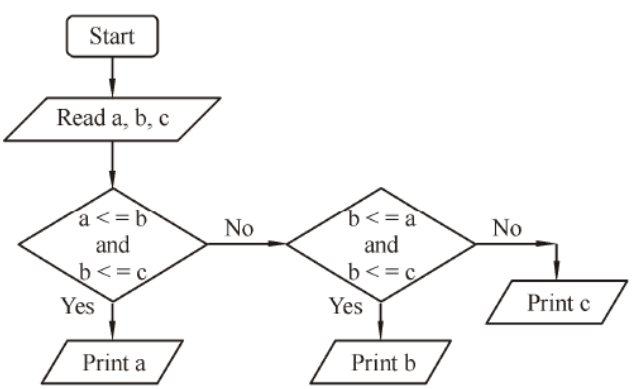
Substitute `num = -5` into the algorithm:

1. `If num > 0`: Is `-5 > 0`? No, this condition is false.
2. The program moves to the `else if` block. `Else if num == 0`: Is `-5 == 0`? No, this condition is also false.
3. Since neither the `if` nor the `else if` conditions were true, the program executes the `else` block. **`else:`** `print num`

At this point, the value of `num` is still `-5` because none of the `num` modification statements in the `if` or `else if` blocks were executed.

Therefore, the output will be `-5`

45. Consider the following flowchart.



What will be the output if

***a* = 10, *b* = 15, *c* = 5?**

a) 10 b) 15

c) error d) 5

Ans : (d)

Let's trace the flowchart with the given input values: `a = 10, b = 15, c = 5`

Step 1: Start and Read a, b, c the values are read: `a = 10, b = 15, c = 5`.

Step 2: First Decision Block `a <= b and b <= c`

Substitute the values: `10 <= 15 and 15 <= 5`

- `10 <= 15` is **True**.
- `15 <= 5` is **False**.
- `True and false` evaluates to **False**.

Since the condition is False ("No" path), the control flows to the next decision block.

Step 3: Second Decision Block `b <= a and b <= c`
Substitute the values: `15 <= 10 and 15 <= 5`

- `15 <= 10` is **False**.
- `15 <= 5` is **False**.
- `False and false` evaluates to **False**.

Since the condition is False ("No" path), the control flows to the `Print c` step.

Step 4: Print c the value of `c` is `5`. So, `5` is printed.

46. Which of the following statements about web browsers is correct?

a) Web browsers translate HTML, CSS and JavaScript into machine code before displaying a web page to the user.

b) Web browsers can only display content written in HTML and CSS, but they cannot execute JavaScript.

c) Web browsers interpret HTML, CSS & JavaScript to render a webpage allowing dynamic content and interaction.

d) Web browsers use server-side programming languages like PHP to render webpages directly

Ans : (c)

- **HTML:** Parsed to understand the structure and content of the page.
- **CSS:** Interpreted to apply styling (colors, fonts, layout, etc.) to the HTML elements.
- **JavaScript:** Executed to provide dynamic behavior, interactivity (e.g., button clicks, form validation, animations), and fetch data.

The combination of these three is how browsers render rich, interactive web pages.

47. Consider the following HTML code snippet.

```
<select name = "cars" id = "carselect">
    <option value = "volvo">Volvo </option>
    <option value = "XUV">XUV</option>
    <option value = "Tata">Tata</option>
<\select>
```

What does the <select> element do in this code?

a) It creates a text input field for users to type in

b) It creates a dropdown list from which the user can select a car brand.

c) It allows users to choose multiple options from a list of cars.

d) It creates a button that users can click to select a car brand

Ans : (b)

AN HTML code snippet. It's a <select> element, which creates a dropdown list (or a selection list) on a web page.

It creates a dropdown list from which the user can select a car brand.

By default, without the `multiple` attribute, a `<select>` element creates a single-selection dropdown list. The options provided are "Volvo", "XUV", and "Tata", which are car brands.

48. Which CSS property is used to set the background color of a webpage?

a) background-color

b) color

c) bg-color

d) background-image

Ans : (a)

CSS property is used to set the background color of a webpage. Let's look at the options:

a) `background-color`: This is the correct CSS property used to define the background color of an element, including the `<body>` element (which represents the entire visible page).

Example: `body { background-color: lightblue; }`

49. Which CSS selector is used to select an HTML element with a specific id?

a) .id b) #id

c) id d) [id]

Ans : (b)

CSS selector for selecting an HTML element with a specific id attribute.

The hash symbol (#) is used as the ID selector.

For example, if you have , you would select it with #header.

HTML element with a specific ID is **b) #id**.

50. Which event is triggered when a user clicks on an HTML element in JavaScript?

a) onload b) onclick

c) onhover d) onchange

Ans : (b)

The `onclick` event is specifically triggered when a user clicks on an HTML element.

It is commonly used in JavaScript to run code when a button, link, or other clickable element is clicked

51. Which of the following factors can help improve a website's SEO ranking?

a) Using JavaScript for content rendering

b) High Keyword density in the content

c) Using relevant and high-quality backlinks

d) Including as many images as possible on the homepage.

Ans : (c)

Impact on SEO: This is a **major positive factor** for SEO. Backlinks (links from other websites to yours) are often seen as "votes of confidence" or endorsements.

Backlinks are links from other websites that point to your site. When **reputable and relevant** websites link to your content, it tells search engines that your site is **trustworthy and authoritative**.

52. Which of the following are the correct description with respect to structured organisation.

(a) Operations → produces goods or services, ensures quality and efficiency.

(b) Marketing → Identifies customer needs, promotes or services.

(c) H.R. (Human Resources): Manages budgeting, accounting and financial planning.

a) (a), (b) b) (a), (b), (c)

c) (a) only d) (b) only

Ans : (a)

HR does not handle budgeting or financial planning — that is handled by Finance.Operations and Marketing statements are correctly matched to their roles.

53. Which of the following statements best describes the purpose of ERP tools in an organisation.

a) ERP tools are designed to manage customer relationships and marketing strategies.

b) ERP tools are used to integrate and automate key business processes across department as finance, HR, inventory and supply chain.

c) ERP tools are primarily focused in managing email communication between employees an organization.

d) ERP tools are closely used for managing the IT infrastructure and hardware resources organisation.

Ans : (b)

ERP (Enterprise Resource Planning) systems unify operations across departments.Their goal is seamless coordination and improved productivity.

54. In cloud computing, data is stored in

a) Local folders b) Physical notebooks

c) Remote servers accessed via the internet

d) USB drives.

Ans : (c)

Cloud computing stores data on internet-connected to servers rather than local devices.This enables global access and scalability.

55. Which of the following is an example of IoT in smart homes?

a) A GPS system in a car for navigation

b) A thermostat that adjusts temperature based on occupancy and preferences

c) An e-commerce website for shopping

d) A manual doorbell

Ans : (b)

Smart thermostats use sensors and connectivity, a core IoT feature.They automate home climate control for efficiency and comfort.

56. Which of the following is an example of Software-as-a-Service (SaaS)?

a) Microsoft Azure b) Google Drive

c) Amazon Web Services (AWS) EC2

d) Google Kubernetes Engine (GKE)

Ans : (a & b)

SaaS delivers applications over the internet without local installation.

- Microsoft Azure is primarily focuses on PaaS but it also provides services of SaaS.
- Google Drive is accessed online and provides storage + editing tools as a service.

57. Which of the following is a platform for developing IoT applications?

a) Google Docs b) Arduino

c) Microsoft d) WinZip

Ans : (b)

Arduino is a widely used open-source electronics platform for building IoT devices.It allows sensors and actuators to be connected and programmed easily.

58. Ravi often uses incognito mode while browsing, believing it protects him from all types of tracking and threats. He does not use antivirus software or phishing protection.

Which of the following statement about Ravi's assumption is correct?

a) Incognito mode provides full malware protection

b) Incognito mode hides activity from the device and protects against all trackers

c) Incognito mode only prevents local history tracking not online threats

d) Incognito mode encrypts his traffic and logic credentials

Ans : (c)

Incognito mode only stops the browser from saving history, cookies, and site data.It does not protect from malware, phishing, or external tracking.

59. Rita is using a public computer in a cyber cafe to check her email. After reading her messages, she closes the browser without logging out of her account.

What cyber safety mistake did Rita make?

a) She read personal emails in public

b) She used a public computer

c) She didn't logout of her account

d) She didn't clear the browsing history

Ans : (c)

Not logging out on public/shared computers can let others access your private data.It poses a high risk of unauthorized access to personal accounts.

60. To safeguard against cyber attacks that steal sensitive information or install malicious software, which browser setting should be enabled?

a) Enable automatic updates

b) Turn on phishing and malware protection

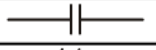
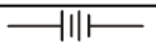
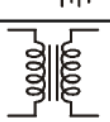
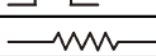
c) Disable phishing and malware protection

d) Enable cookies

Ans : (b)

This setting warns users about harmful websites and malicious downloads. It reduces the risk of identity theft and malware infection.

61. Match the following with symbols

i) Resistance	**a)** 
ii) Transformer	**b)** 
iii) Capacitor	**c)** 
iv) Battery	**d)** 

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

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

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

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

Ans : (d)

62. Earthing plate is made up of _____

a) Bakelite b) Aluminum

c) Copper d) Plastic

Ans : (c)

Explanation: Copper is a good conductor of electricity and corrosion-resistant, making it ideal for use in earthing systems to provide a low-resistance path to the ground.

63. Match the following:

i) Current	**a) Watts**
ii) Power	**b) Hertz**
iii) Energy	**c) Kwh**
iv) Frequency	**d) Ampere**

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

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

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

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

Ans : (d)

Current is measured in amperes

Power is measured in watts.

Energy is measured in kilowatt-hours (kWh).

Frequency is measured in hertz (Hz).

64. If resistance of value 12Ω and 6Ω are connected in parallel, the equivalent resistance of the combination is

a) 18 Ω b) 06 Ω

c) 04 Ω d) 02 Ω

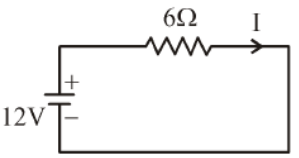
Ans : (c)

For parallel resistors:

$$\frac{1}{R}=\frac{1}{R_1}+\frac{1}{R_2}=\frac{1}{12}+\frac{1}{6}=\frac{1+2}{12}=\frac{3}{12}=\frac{1}{4}$$

$\Rightarrow R = 4\Omega$

65. In a given electrical circuit, find the value of current.



a) 72A b) 0.5 A

c) 2A d) 1.2A

Ans : (c)

Explanation:

Given, $R = 6\Omega, V = 12V$

Ohm's Law $I = \frac{V}{R}$

$$I = \frac{12}{6} = 2A$$

66. The frequency of signal with a period of 0.02 Sec is

a) 100 Hz b) 200 Hz

c) 50 Hz d) 150 Hz

Ans : (c)

Explanation: $f = \frac{1}{T} = \frac{1}{0.02} = 50$ Hz

67. In a pure resistive circuit, which one of the following statement is true?

a) Both current and voltage are in phase

b) Current leads the voltage

c) Voltage lags the current

d) Both current and voltage are out of phase

Ans : (a)

Explanation: In a pure resistive AC circuit, current and voltage reach their peak and zero values simultaneously. So, they are **in phase**.

68. HRC fuses can be used upto a maximum current of _____

a) 250 mA b) 500 mA

c) 1A d) 1250 A

Ans : (d)

High Rupturing Capacity (HRC) fuses are designed to handle **very high fault currents,** typically up to **1250 A or more**, depending on the rating.

69. To control single lamp from two different places, the control switch used is ____ switch.

a) Double pole b) Two way

c) Single pole d) One way

Ans : (b)

Explanation: Two-way switches allow a single lamp or device to be controlled from **two different locations**, such as at the top and bottom of a staircase.

70. A fuse is always connected ____ to the circuit.

a) Parallel b) Across the load

c) Series d) Across the supply

Ans : (c)

A fuse is connected **in series** so that if excessive current flows, the fuse will blow and **break the circuit** to prevent damage.

71. In a Transformer, _____ remains constant

a) Voltage b) Frequency

c) Current d) Both current and voltage

Ans : (b)

In both step-up and step-down transformers, the **frequency of the input and output remains the same** (e.g., 50 Hz in India).

72. The combination of two or more cells is _____

a) Battery b) load cell

c) Primary cell d) Generator

Ans : (a)

A **battery** is formed by connecting **two or more cells** in series or parallel to provide a combined voltage or capacity.

73. Match the following:

i) Ampere hour	**a) 1ϕ Induction motor**
ii) KVA	**b) lead acid battery**
iii) Star delta	**c) Transformer**
iv) Fan	**d) 3ϕ Induction motor**

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

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

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

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

Ans : (c)

Ampere-hour is the unit of charge/storage capacity (used for **batteries**)

KVA is used for apparent power rating, often for **transformers**.

Star-delta is a starting method for **3-phase motors**.

Fan typically uses a **1-phase induction motor**.

74. In a transformer, the winding to which the load connected is called _____ winding

a) Primary b) Axillary

c) Secondary d) Concentric

Ans : (c)

In a transformer, the **secondary winding** is connected to the **load** and delivers the output voltage.

75. Which of the following statements is FALSE with respect to transformer?

a) Converts high voltage to low voltage

b) Converts high frequency to low frequency

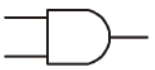
c) Converts low voltage to high voltage

d) Transfers energy at constant frequency

Ans : (b)

A transformer **does not change the frequency** of the input signal. It works on **AC of constant frequency** (e.g., 50 Hz). It can **step up or step down voltage**, but the frequency remains unchanged. So, option (2) is false.

76. Match the following logic gates with their symbols:

i) AND	**a)** 
ii) OR	**b)** 
iii) NAND	**c)** 
iv) NOR	**d)** 

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

Ans : (d)

77. Which of the following is a common type of sensor used for measuring temperature?

a) Proximity sensor b) Pressure sensor
c) Flow sensor d) Thermocouple

Ans : (d)
A **thermocouple** is a widely used temperature sensor that converts thermal energy into electrical voltage. It's durable, simple, and accurate over wide temperature ranges

78. What does the fourth band in a 4-band resistor indicate?

a) Resistance b) Multiplier
c) Power rating d) Tolerance

Ans : (d)
In a 4-band resistor:
1st & 2nd bands = significant digits
3rd band = multiplier
4th band = tolerance

79. Which of the following is an example of Insulator?

a) Aluminium b) Rubber c) Iron d) Silicon

Ans : (b)
Rubber is a good **electrical insulator**; it resists the flow of electric current.
Aluminium and Iron are conductors.
Silicon is a semiconductor.

80. Diode is made up of _____ material.

a) Conducting b) Semiconducting
c) Insulating d) Electronic

Ans : (b)
A **diode** is made using **semiconductor materials** like **Silicon or Germanium**. It allows current to flow in only one direction due to the p-n junction.

81. Complete the following analogy.
Project : Deliverables :: Operation : _____

a) Deadlines b) Efficiency
c) Repetition d) Conclusion

Ans : (c)
Project are temporary endevors with specific goals and deliverables operations are permanent process with repetative outcome.

82. Multiple objectives are achieved again and again in _____

a) Operation b)Project c) Business d) Sales

Ans : (a)
Operation are considered as repetative process hence multiples objectives are achieved again & again.

83. Which of the following are the examples of consultancy firms?

A) Accenture B) TCS
C) Tata Motors D) Birla Technical Services

Codes:

a) A, B and C only b) A, B and D only
c) A and D only d) A, B, C and D

Ans : (b)
Accenture, TCS and Birla Technical services are works as consultancy firms where as Tata motors are automotive manufacturing.

84. Which of the following is NOT an obstacle in project management?

a) Undefined project scope
b) Poor communication among team members
c) Clear project objectives and goals
d) Limited resources

Ans : (c)

Option a, b, d are obstacle of project management and option 'c' is an advantage of project management.

85. Complete the following analogy

Project procedure Manual : Provides standard operating procedures : : Project diary : _____

a) Records daily events and issues
b) Provides step-by-step instructions
c) Outlines rules and processes
d) Used only during project closure

Ans : (a)

Project diary is a document used to record daily events activities and issues throughout project life cycle.

86. Match the following

i) Initial project team	**a) Guides the project with advice and support**
ii) Core project team	**b) Works on the project every day, making decisions and doing tasks**
iii) Project stakeholders	**c) People interested in the project outcomes like clients or sponsors.**
iv) Project advisors	**d) Helps to start the project and plan the initial steps**

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

Ans : (a)

87. What does Work Breakdown Structure (WBS) do to help a Project Manager?

a) Track the project's financial performance
b) Breakdown the project into smaller, manageable tasks.
c) Determine project's risk level
d) Allocate resources to team members

Ans : (b)

WBS - Work Breakdown Structure is a breakdown of work from complex to smaller, manageable tasks.

88. Which of the following is NOT a subpart of Project Execution Plan (PEP)?

a) Organizational plan b) Work packing plan
c) Staffing plan d) Contracting plan

Ans : (c)

Staffing plan is not included in PEP.

89. High demand, high selling price, low variable cost are the examples of _____

a) Normal Scenario b) Worst Scenario
c) Best Scenario d) Abnormal Scenario

Ans : (c)

High demand, high selling price, low variable cost are considered as best scenario.

90. In ____ phase, project definition and problem identification are defined

a) Planning b) Execution
c) Initiation d) Closure

Ans : (c)

Initiation is the first phase of project life cycle where, project is defined and problems are identified.

91. Risk arising due to fluctuation of interest rate OR mistakes in accounting is known as _____ risks.

a) Policy b) Technical
c) Marketing d) Financial

Ans : (d)

Financial risks arise due to fluctuation of interest rate or mistakes in accounting.

92. Assertion (A) : Time overrun can lead to cost overrun in a project.

Reason (R) : More time often means, more money spent on labour and resources.

a) Both (A) and (R) are true and (R) is the correct explanation of (A)

b) Both (A) and (R) are true but (R) is not the correct explanation of (A)

c) (A) is true, but (R) is false

d) (A) is false, but (R) is true

Ans : (a / b)

93. The full form of CPM in project management is _____

a) Critical Process Management

b) Critical Path Method

c) Continuous Project Monitoring

d) Cost Planning Model

Ans : (b)

CPM - Critical Path Method

94. Which of the following is NOT a tool of project planning, scheduling and monitoring?

a) Gantt Chart b) Flow chart

c) PERT Chart d) Milestone Chart

Ans : (b)

Flow chart is not a tool used for project planning scheduling and monitoring.

95. Project Evaluation can be done _____

a) At the end of the project only

b) Throughout the project lifecycle

c) Only during the planning phase

d) At the start of the project only

Ans : (b)

Project evaluation is done throughout the project life cycle.

96. Identify the incorrect statement regarding the functions of project planning.

a) Defines project goals and objectives

b) Allocates resources without considering constraints

c) Establishes a project timeline and milestones.

d) Identifies potential-risks and mitigates them

Ans : (b)

Project planning allocate resources by considering constraints.

97. Which of the following is NOT a key component of "SMART" goal?

a) Time-Bound b) Random

c) Achievable d) Specific

Ans : (b)

SMART - Specific, Measurable, Achievable, Realistic, Timely / Time-Bound.

98. The process of correcting and rectifying the errors in the project is _____

a) Project Audit b) Project Monitoring

c) Project Evaluation d) Project Review

Ans : (d)

Project review is defined as process of correcting and rectifying the errors in the project.

99. The time estimation for a given project are as follows: Optimistic Time = 4 days, Pessimistic time = 8 days, Most likely time = 6 days. The expected time to complete is ____

a) 7 days b) 6 days c) 5 days d) 4 days

Ans : (b)

$$T_e = \frac{t_o + 4tm + t_p}{6} = \frac{4 + 4(6) + 8}{6} = \frac{36}{6} = 6 \text{ days}$$

100. Watching 3D movie is an example of _____

a) Augmented Reality b) Virtual Reality

c) Augmented and Virtual Reality

d) Cloud Technology

Ans : (a, b, c)

Watching 3D movie is an example of both augmented and virtual reality.