

**Airforce  
Group X**

**Previous Year Paper  
MBT 15-Jul-2021 Shift 1**

## 70 Questions

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**Que. 1** Henry is the unit of ?

1. Capacitance
2. Inductance
3. Magnetic Intensity
4. Frequency

**Solution** Correct Option - 2

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**Que. 2** Which of the following is the dimension of electrostatic potential?

1.  $[ML^2T^{-2}C]$
2.  $[ML^2T^{-3}I^{-1}]$
3.  $[ML^2T^{-1}]$
4.  $[M^2L^{-2}T^{-3}]$

**Solution** Correct Option - 2

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**Que. 3** Which of the following is a scalar quantity?

1. Electric field
2. Electrostatic potential
3. Electrostatic force
4. Intensity of electric field

**Solution** Correct Option - 2

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**Que. 4** The electromagnetic waves travel with a velocity

1. Equal to the velocity of sound
2. Equal to the velocity of light
3. Less than the velocity of light
4. None of these

**Solution** Correct Option - 2

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**Que. 5** The weight of an object in the coal mine, sea level and at the top of the mountain, are respectively  $W_1$ ,  $W_2$ , and  $W_3$ , then

1.  $W_1 < W_2 < W_3$
2.  $W_1 > W_2 > W_3$
3.  $W_1 = W_2 = W_3$
4.  $W_1 < W_2 > W_3$

**Solution** Correct Option - 4

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**Que. 6** Poisson ratio is defined as

1. Lateral strain divided by longitudinal strain
2. Longitudinal strain divided by lateral strain
3. Longitudinal strain divided by shearing strain
4. Lateral strain times longitudinal strain

**Solution** Correct Option - 1

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**Que. 7** The breaking stress of a wire depends upon

1. material of wire
2. length of wire
3. radius of wire
4. shape of cross-section

**Solution** Correct Option - 1

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**Que. 8** If two bodies of different masses have the same kinetic energy, which body mass will have more momentum?

1. The body with more mass will have more momentum
2. the body with less mass will have more momentum
3. Both the bodies will have the same momentum
4. Nothing can be said about momentum

**Solution** Correct Option - 1

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**Que. 9** Which of the following is correct?

1. Modulation is a process of superimposing low frequency base band signal with high frequency carrier.
2. Modulation is not necessary for effective transmission of signal from transmitter to receivers.
3. Demodulation is the same process like modulation.
4. None

**Solution** Correct Option - 1

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**Que. 10** A body of mass  $M$  hits normally a rigid wall with velocity  $V$  and bounces back with the same velocity. The impulse experienced by the body is

1. Zero
2.  $MV$
3.  $1.5 MV$
4.  $2 MV$

**Solution** Correct Option - 4

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**Que. 11** If  $dQ$  is the heat given to thermodynamic system and  $dU$  is its change in internal energy and  $dW$  is the work done on the system, then the first law of thermodynamics concludes that:

1.  $dQ = dW$
2.  $dQ = dU - dW$
3.  $dQ = dW + dU$
4.  $dQ = dU$

**Solution** Correct Option - 2

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**Que. 12** An ideal gas heat engine operates in Carnot's cycle between  $227^{\circ}\text{C}$  and  $127^{\circ}\text{C}$ . It absorbs  $6 \times 10^4\text{ J}$  at high temperature. The amount of heat converted into work is \_\_\_\_\_

1.  $4.8 \times 10^4 \times \text{J}$
2.  $3.5 \times 10^4 \times \text{J}$
3.  $1.6 \times 10^4 \times \text{J}$
4.  $1.2 \times 10^4 \times \text{J}$

**Solution** Correct Option - 4

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**Que. 13** Which of the following represent **incorrect** statement regarding longitudinal wave?

1. Direction of disturbance and direction of propagation is always perpendicular.
2. Direction of disturbance and direction of propagation is always parallel.
3. Sound waves are longitudinal in nature.
4. Longitudinal waves produce in a medium that can sustain compressive strain.

**Solution** Correct Option - 1

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**Que. 14** A ray of light is incident on a plane mirror at an angle of  $30^{\circ}$ . The angle of deviation produced by the mirror is

1.  $30^{\circ}$
2.  $60^{\circ}$
3.  $90^{\circ}$
4.  $120^{\circ}$

**Solution** Correct Option - 4

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**Que. 15** Which of the following magnitude of charge cannot be produced on the body:

1.  $3.2 \times 10^{-19}\text{ C}$
2.  $4.2 \times 10^{-19}\text{ C}$
3.  $4.8 \times 10^{-19}\text{ C}$
4.  $6.4 \times 10^{-19}\text{ C}$

**Solution** Correct Option - 2

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**Que. 16** A battery of EMF  $4\text{ V}$  and internal resistance of  $2\ \Omega$  is connected to a resistor of resistance  $7\ \Omega$ . The current flowing through the circuit is

1.  $0.33\text{ A}$
2.  $0.66\text{ A}$
3.  $0.55\text{ A}$
4.  $0.44\text{ A}$

**Solution** Correct Option - 4

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**Que. 17**

If initial velocity of a projectile motion becomes half and angle of projection remains same, the maximum height of the the projectile motion will become

1. double of initial maximum height
2. half of initial maximum height
3. triple of initial maximum height
4. quarter of initial maximum height

**Solution** Correct Option - 4

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**Que. 18** The electric and the magnetic field, associated with an e.m. wave, propagating along the +z-axis, can be represented by

1.  $[\vec{E} = E_0 \hat{j}, \vec{B} = B_0 \hat{k}]$
2.  $[\vec{E} = E_0 \hat{i}, \vec{B} = B_0 \hat{j}]$
3.  $[\vec{E} = E_0 \hat{k}, \vec{B} = B_0 \hat{i}]$
4.  $[\vec{E} = E_0 \hat{j}, \vec{B} = B_0 \hat{i}]$

**Solution** Correct Option - 2

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**Que. 19** Maximum elasticity is in

1. Rubber
2. steel
3. Silver
4. Glass

**Solution** Correct Option - 2

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**Que. 20** Two charges  $+8\mu\text{C}$  and  $+2\mu\text{C}$  are placed at 2 cm apart, then the ratio of the force exerted on charge  $+8\mu\text{C}$  and  $+2\mu\text{C}$  will be:

1. 1 : 1
2. 4 : 1
3. 1 : 4
4. 16 : 1

**Solution** Correct Option - 1

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**Que. 21** If the refractive index of the material increase then what will be the impact on the critical angle?

1. It will increase
2. It will decrease
3. No change
4. It will initially increase and then decrease.

**Solution** Correct Option - 2

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**Que. 22** The angular acceleration of a particle under uniform circular motion is:

1. zero
2. variable

- uniform and non-zero
- none of the above

**Solution** Correct Option - 1

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**Que. 23** Dispersion of light takes place because

- of shape of prism
- refraction process
- of difference in refractive index for different wavelengths
- of prism creating colours

**Solution** Correct Option - 3

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**Que. 24** If  $\alpha$ ,  $\beta$  and  $\gamma$  are the coefficients of linear, area and volume expansion of the solid cube, the relation between  $\alpha$ ,  $\beta$  and  $\gamma$  are:

- $6\alpha = 3\beta = 2\gamma$
- $3\alpha = 6\beta = \gamma$
- $6\alpha = 2\beta = 3\gamma$
- $3\alpha = \beta = 2\gamma$

**Solution** Correct Option - 1

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**Que. 25** Which of the following quantity of the charged particle does not change in the cyclotron:

- Speed
- Momentum
- Time-period
- None of these

**Solution** Correct Option - 3

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**Que. 26** For a invertible matrix A if  $A(\text{adj } A) = \begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$  then  $|A| =$

- 100
- 100
- 10
- 10

**Solution** Correct Option - 3

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**Que. 27** What are the values of x that satisfy the equation  $\begin{vmatrix} x & 0 & 2 \\ 2x & 2 & 1 \\ 1 & 1 & 1 \end{vmatrix} + \begin{vmatrix} 3x & 0 & 2 \\ x^2 & 2 & 1 \\ 0 & 1 & 1 \end{vmatrix} = 0$  ?

- $-2 \pm \sqrt{3}$
- $-1 \pm \sqrt{3}$
- $-1 \pm \sqrt{6}$
- $-2 \pm \sqrt{6}$

**Solution** Correct Option - 4

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**Que. 28** The value of  $\int_0^{\frac{\pi}{2}} \frac{\sec^2 x}{2+2 \tan^2 x} dx$  is:

1. 0
2. 1
3.  $\frac{\pi}{2}$
4.  $\frac{\pi}{4}$

**Solution** Correct Option - 4

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**Que. 29** Find the multiplicative inverse of  $4 - 3i$  ?

1.  $\frac{4}{25} - i \frac{3}{25}$
2.  $\frac{3}{25} - i \frac{4}{25}$
3.  $\frac{3}{25} + i \frac{4}{25}$
4.  $\frac{4}{25} + i \frac{3}{25}$

**Solution** Correct Option - 4

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**Que. 30** A and B are two events such that  $P(B) = 0.4$  and  $P(A \cup B) = 0.6$  If A and B are independent, then P(A) is

1.  $\frac{1}{2}$
2.  $\frac{1}{3}$
3.  $\frac{2}{3}$
4.  $\frac{2}{5}$

**Solution** Correct Option - 2

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**Que. 31** If  ${}^n C_6 : {}^{n-3} C_3 = 7 : 4$ , then find the value of  ${}^n C_3$

1. 10
2. 12
3. 32
4. 35

**Solution** Correct Option - 4

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**Que. 32**  $\lim_{x \rightarrow 0} \frac{\sqrt{\left(\frac{1}{2}(1-\cos 2x)\right)}}{x}$  is equal to

1. 1
2. -1
3. 0
4. none of these

**Solution** Correct Option - 4

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**Que. 33**

Find  $\frac{d^2 \tan x}{dx^2}$

1.  $\sec^2 x$
2.  $2\sec^2 x \tan x$
3.  $\sec x \tan x$
4. None of these

**Solution** Correct Option - 2

**Que. 34** Evaluate:  $\int \frac{1-\cos 2x}{1-\sin^2 x} dx$

1.  $\tan x - 2x + c$
2.  $2 \tan x - x + c$
3.  $2 \tan x - 2x + c$
4.  $2 \tan x + 2x + c$

**Solution** Correct Option - 3

**Que. 35** The third term of GP is 4. Find the product of its first 5 terms ?

1.  $4^4$
2.  $5^4$
3.  $4^5$
4.  $4^6$

**Solution** Correct Option - 3

**Que. 36** If  $1 + \cos^2 \theta = 3 \sin \theta \cos \theta$ , then the integral value of  $\cot \theta$  is ( $0 < \theta < \pi/2$ )

1. 3
2. 1
3. 0
4. 2

**Solution** Correct Option - 2

**Que. 37** What is the area of the region enclosed between the curve  $y^2 = 4x$  and the straight line  $y = 2x$ ?

1.  $1/3$
2.  $3/4$
3.  $3/7$
4. None of the above

**Solution** Correct Option - 1

**Que. 38** What is the degree of the following differential equation?

$$x = \sqrt{1 + \frac{d^2 y}{dx^2}}$$

1. 1



2. 2
3. 3
4. Degree is not defined

**Solution** Correct Option - 1

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**Que. 39** If  $f(x)$  is an increasing function and  $g(x)$  is a decreasing function such that  $g \circ f(x)$  is defined, then  $g \circ f(x)$  will be

1.  $g \circ f(x)$  is an increasing function
2.  $g \circ f(x)$  is decreasing function
3.  $g \circ f(x)$  is constant function
4. None of the above

**Solution** Correct Option - 2

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**Que. 40** Find the length of latus rectum of ellipse,  $5x^2 + 3y^2 = 60$ .

1.  $\frac{10}{\sqrt{3}}$  units
2.  $\frac{12}{\sqrt{5}}$  units
3.  $\frac{14}{\sqrt{5}}$  units
4.  $\frac{20}{\sqrt{3}}$  units

**Solution** Correct Option - 2

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**Que. 41** Find the equation of a circle with centre at  $(2, -3)$  and radius 5 units.

1.  $x^2 + y^2 - 4x + 6y - 12 = 0$
2.  $x^2 + y^2 - 4x - 6y - 12 = 0$
3.  $x^2 + y^2 + 10x + 2y + 22 = 0$
4. None of these

**Solution** Correct Option - 1

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**Que. 42** The length of three medians of a triangle are 9 cm, 12 cm and 15 cm. Then the area of triangle is:

1.  $24 \text{ cm}^2$
2.  $72 \text{ cm}^2$
3.  $48 \text{ cm}^2$
4.  $144 \text{ cm}^2$

**Solution** Correct Option - 2

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**Que. 43** Find the value of  $\cos(\sin^{-1} \frac{1}{5})$ .

1.  $\frac{1}{\sqrt{5}}$
2.  $\frac{2\sqrt{6}}{5}$

3.  $-\frac{1}{\sqrt{5}}$
4.  $-\frac{2\sqrt{6}}{5}$

**Solution** Correct Option - 2

**Que. 44** If  $y = x^n \log \cos x + \frac{x \log x}{\sin x^2}$  then  $dy/dx$

1.  $\frac{\sin x^2(1+\log x) - x \log x \cos^2 2x}{(\sin x^2)^2}$
2.  $n x^{n-1} \log \cos x$
3.  $-x^n \tan x$
4.  $n x^{n-1} \log \cos x - x^n \tan x + \frac{\sin x^2(1+\log x) - x \log x \cos^2 2x}{(\sin x^2)^2}$

**Solution** Correct Option - 4

**Que. 45** If  $y = b \sin^3 t$  and  $x = a \cos^3 t$ , then find the value of  $\frac{dy}{dx}$

1.  $-\frac{b}{a} \tan t$
2.  $\frac{b}{a} \tan t$
3.  $\frac{a}{b} \cot t$
4.  $-\frac{a}{b} \cot t$

**Solution** Correct Option - 1

**Que. 46** Find the angle  $\theta$  between the vectors  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$  and  $\vec{b} = \hat{i} - \hat{j} - \hat{k}$ ?

1.  $\cos^{-1} \left(-\frac{1}{5}\right)$
2.  $\cos^{-1} \left(-\frac{1}{4}\right)$
3.  $\cos^{-1} \left(-\frac{1}{3}\right)$
4.  $\cos^{-1} \left(\frac{1}{3}\right)$

**Solution** Correct Option - 3

**Que. 47** Middle term for the expansion of  $(2x - 3)^8$  is:

1. 3<sup>rd</sup>
2. 4<sup>th</sup>
3. 5<sup>th</sup>
4. 6<sup>th</sup>

**Solution** Correct Option - 3

**Que. 48** If A and B are the domain and range respectively for the relation R such that  $R = \{(x, 2x + 1) : x \in \{0, 1, 2, 3, 4, 5\}\}$  then which of the following option is true ?

1.  $A = \{0, 1, 2, 3, 4, 5\}$  and  $B = \{1, 3, 5, 7, 9, 10\}$
2.  $A = \{0, 1, 2, 3, 4, 5\}$  and  $B = \{1, 2, 5, 7, 9, 11\}$

3.  $A = \{0, 1, 2, 3, 4, 5\}$  and  $B = \{1, 3, 5, 7, 9, 11\}$

4.  $A = \{0, 1, 2, 3, 4, 5\}$  and  $B = \{1, 3, 5, 7, 8, 11\}$

**Solution** Correct Option - 3

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**Que. 49** Find the equation of the parabola with focus at  $F(3, 0)$  and directrix  $x = -3$  ?

1.  $y^2 = 6x$

2.  $y^2 = 12x$

3.  $y^2 = 8x$

4. None of these

**Solution** Correct Option - 2

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**Que. 50** If  $A = \{2, 3\}$ ,  $B = \{4, 5\}$ ,  $C = \{5, 6\}$ , then what is the number of elements in  $A \times (B \cap C)$ ?

1. 2

2. 4

3. 6

4. 8

**Solution** Correct Option - 1

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**Que. 51** **Direction: Change the Voice -**

They have built a perfect dam across the river.

1. A perfect dam have been built by them across the river.

2. A perfect dam had been built by them across the river.

3. A perfect dam has been build by them across the river.

4. A perfect dam has been built by them across the river.

**Solution** Correct Option - 4

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**Que. 52** **Direction: Change the Narration-**

The boys said, "Hurrah! we have won the match"

1. The boys exclaimed with joy that they had win the match.

2. The boys exclaimed with joy that they had won the match.

3. The boys exclaimed with joy that they have won the match.

4. The boys exclaimed with joy that they has won the match.

**Solution** Correct Option - 2

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**Que. 53** **Direction: Fill in the blank with the correct answer:**

You \_\_\_\_\_ wasting your parent's money.

1. are

2. is

3. was

4. None of these

**Solution** Correct Option - 1

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**Que. 54** **Direction: Fill in the blank with the correct answer:**

There is no limit \_\_\_\_\_ human desires.

1. to
2. of
3. at
4. on

**Solution** Correct Option - 1

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**Que. 55** **Direction: Find out which part has an error and mark it as your answer. If there is no error, mark 'No error' as your answer.**

I inquired of him (A) / why he is so negligent (B) / in his studies. (C) / No error (D)

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

**Solution** Correct Option - 2

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**Que. 56** **Direction: In the following sentences, four words or phrases have been underlined. One of them is incorrect. Choose the incorrect word or phrase from the options.**

Mathematics will taught in his school by Rahul Sir.

1. will taught
2. in
3. his school
4. by Rahul Sir

**Solution** Correct Option - 1

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**Que. 57** **Direction: Fill in the blank with the correct answer:**

Dilip Kumar \_\_\_\_\_ film fare awards for his Indian films.

1. received
2. will receive
3. will be recieving
4. None of these

**Solution** Correct Option - 1

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**Que. 58** **Direction: Fill in the blank with the correct answer:**

You and \_\_\_\_\_ are going to meet on Sunday.

1. me
2. I
3. him
4. None of these

**Solution** Correct Option - 2

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**Que. 59** **Direction:** Choose the correct spelling of the word among the following:

1. Generally
2. Genarally
3. Jenerally
4. Ganarally

**Solution** Correct Option - 1

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**Que. 60** **Direction:** Select the option that is similar in meaning to the given word and mark your response accordingly.

Rectify

1. Incorrect
2. Generate
3. Destroy
4. Correct

**Solution** Correct Option - 4

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**Que. 61** **Select the most appropriate ANTONYM of the given word.**

ABANDON

1. Quit
2. Resign
3. Surrender
4. Acquire

**Solution** Correct Option - 4

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**Que. 62** **Direction:** Verb form of 'Adorable' is \_\_\_\_\_.

1. Adoration
2. Adore
3. Adornment
4. None of these

**Solution** Correct Option - 2

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**Que. 63** **Direction:** Given below is a short passage followed by some items based on the passage. First, read the passage and answer the items based on it. You are required to select your answers based on the contents of the passage and the opinion of the author only.

WHO is bringing the world's scientists and global health professionals together to accelerate the research and development process, and develop new norms and standards to contain the spread of the coronavirus pandemic and help care for those affected. The R&D Blueprint has been activated to accelerate diagnostics, vaccines and therapeutics for this novel coronavirus. The **solidarity** of all countries will be essential to ensure equitable access to COVID-19 health products.

WHO is gathering the latest international multilingual scientific findings and knowledge on COVID-19. The global literature cited in the WHO COVID-19 database is updated daily (Monday through Friday) from searches of bibliographic databases, hand searching, and the addition of other expert-referred scientific articles.

The most suitable title of the passage would be:

1. Global research on coronavirus
2. Literature survey of coronavirus
3. Global research on multilingual scientific findings
4. Global research on therapeutics

**Solution** Correct Option - 1

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**Que. 64** What is the purpose of WHO?

1. to boost up the research work to control the spread of coronavirus pandemic.
2. to boost up the vaccination drive.
3. to motivate people to wear masks.
4. to determine the root cause of coronavirus.

**Solution** Correct Option - 1

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**Que. 65** What is the basic necessity to confirm the equal distribution of COVID-19 health products?

1. more production of COVID-19 health products
2. less production of COVID-19 health products
3. agreement between the countries
4. disagreement between the countries

**Solution** Correct Option - 3

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**Que. 66** Which of the following words could replace the word '**solidarity**' as used in the passage?

1. unanimity
2. division
3. anonymous
4. disharmony

**Solution** Correct Option - 1

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**Que. 67** **Direction:** Choose the correct alternative which can be substituted for the given sentence.

One with unlimited power

1. Chirographer
2. Autocrat
3. Funambulist
4. Obstetrician

**Solution** Correct Option - 2

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**Que. 68** Choose the appropriate answer for the given sentence:

He agreed \_\_\_\_\_ me.

1. upon
2. to
3. with

4. None of these

**Solution** Correct Option - 3

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**Que. 69** **Direction:** Choose the appropriate answer for the given sentence:

The train runs \_\_\_\_\_ Mumbai and New Delhi.

1. from
2. for
3. towards
4. between

**Solution** Correct Option - 4

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**Que. 70** **Direction:** Choose the correct meaning of the following phrase/idiom:

Good things come to those who wait

1. Be curious
2. Be furious
3. Be satisfied
4. Be patient

**Solution** Correct Option - 4