Airforce Group X

Previous Year Paper

MBT 13-Jul-2021 Shift 3

70 Questions

Que. 1 When temperature of metal is increased, its $\frac{V}{I}$ _____?

1. decrease
2. increase
3. either increase or decrease
4. have no change

Solution Correct Option - **2**

Que. 2 The force between the two charges is F. If the magnitude of the two charges is halved and the distance between them is also halved, then the force between the charges will be:

1. 2F
2. F/2
3. F
4. 4F

Solution Correct Option - **3**

Que. 3 If G is the gravitational constant, g is the acceleration due to gravity, and R is the radius of the earth, then the ratio of G/g will be

1. $\frac{R^2}{M}$
2. $\frac{R}{M^2}$
3. R^2M
4. $\frac{M^2}{R}$

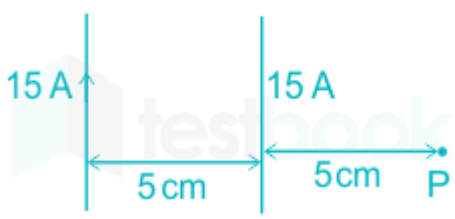
Solution Correct Option - **1**

Que. 4 Which of the following pairs of physical quantities does have same dimensional formula?

1. Tension and acceleration due to gravity
2. Torque and momentum
3. Torque and potential energy
4. Torque and surface tension

Solution Correct Option - **3**

Que. 5 If the distance between the two long straight wires is 5 cm, with each carrying a current of 15 A in the same direction, then find a magnetic field at P



1. 3×10^{-7} T
2. 5×10^{-7} T
3. 7×10^{-7} T
4. 12×10^{-7} T

Solution Correct Option **- 1**

Que. 6 A force $\vec{F} = 2\hat{i} + 5\hat{j} - 3\hat{k}$ is applied on an object. This force vector is applied at a point located at $\vec{r} = 2\hat{i} + \hat{j} + 2\hat{k}$. What is the torque applied on the object with respect to origin?

1. $13\hat{i} - 10\hat{j} + 8\hat{k}$
2. $8\hat{i} + 2\hat{j} - 12\hat{k}$
3. $8\hat{i} - 2\hat{j} + 12\hat{k}$
4. $-13\hat{i} - 10\hat{j} + 8\hat{k}$

Solution Correct Option **- 4**

Que. 7 Necessary condition to observe diffraction is that

1. The size of obstacle should be of the same order as wavelength
2. The size of obstacle should be much smaller than the wavelength
3. no restriction
4. The size of obstacle should be exactly $\frac{\lambda}{2}$

Solution Correct Option **- 1**

Que. 8 Which logic gate will produce the following output

A	**A = Y**
0	1
1	0

1. OR
2. AND
3. NOT
4. NAND

Solution Correct Option **- 3**

Que. 9 For an object to be in equilibrium what should be the condition

1. Acceleration = 0
2. Velocity = 0
3. both = 0
4. None of these

Solution Correct Option **- 1**

Que. 10 On increasing temperature, the resistance of semiconductors:

1. increases
2. decreases
3. remains same
4. first rises then falls

Solution Correct Option **- 2**

Que. 11 A man uses a concave mirror for shaving. He keeps his face at a distance of 25 cm from the mirror and gets an image which is 1.4 times enlarged. Find the focal length of the mirror.

1. 87.5 cm
2. 68.5 cm
3. 24.5 cm
4. 48.5 cm

Solution Correct Option **- 1**

Que. 12 The ability of a body to resist permanent changes to it under the influence of stress acting on it is termed as-

1. rigidity
2. elasticity
3. plasticity
4. fluidity

Solution Correct Option **- 2**

Que. 13 Work done by the gas in an isochoric process is _____. (where all the parameters V, T, P are standard)

1. W = 0
2. $W = P (V_2 - V_1)$.
3. $W = nRT\ ln(\frac{V_{final}}{V_{initial}})$
4. $W = \infty$

Solution Correct Option **- 1**

Que. 14 When a body moves with simple harmonic motion, then the phase difference between the velocity and the acceleration is

1. 0°
2. 90°
3. 180°
4. 270°

Solution Correct Option **- 2**

Que. 15 Which of the following is a path function in thermodynamics?

1. Work
2. density
3. internal energy

4. enthalpy

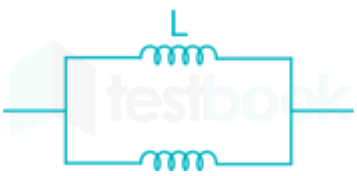
Solution Correct Option - **1**

Que. 16 A uniformly charged conducting sphere with radius R and charge Q is placed in vacuum. The potential at a point P at a distance r from the center of the sphere is: (assume electric potential at infinity to be zero)

1. Zero
2. $\frac{Q}{4\pi\epsilon_0 R}$
3. $\frac{Q}{4\pi\epsilon_0 r}$
4. $\frac{Q}{4\pi\epsilon_0 r^2}$

Solution Correct Option - **3**

Que. 17 Find the equivalent inductance of the given circuit



1. L
2. L/2
3. 2L
4. L/4

Solution Correct Option - **2**

Que. 18 The magnetic field at the centre of current carrying coil is B_0 If its radius is reduced to half keeping current the "same then magnetic field at its centre become:

1. B_0
2. $2B_0$
3. $4B_0$
4. $\frac{B_0}{2}$

Solution Correct Option - **2**

Que. 19 If a Carnot refrigerator operates between 0°C and 100°C, its coefficient of performance will be-

1. $\frac{373}{273}$
2. $\frac{100}{273}$
3. $\frac{273}{273}$
4. $\frac{273}{100}$

Solution Correct Option - **4**

Que. 20 The dimensions of magnetic field are _____.

1. $ML^3T^{-2}A^{-1}$
2. $ML^0T^{-2}A^{-1}$
3. $M^2L^0TA^{-1}$
4. MLTA

Solution Correct Option **- 2**

Que. 21 The half life of a radioactive element is T and λ, is its decay constant, then:

1. $\lambda T = 1$
2. $\lambda T = \frac{1}{2}$
3. $\lambda T = \log_e 2$
4. $\lambda = -\log_e 2T$

Solution Correct Option **- 3**

Que. 22 Consider an object moving with constant acceleration along a straight road and the distance covered by the object is given by equation $x = \alpha t^3 + \beta t^2 + \gamma t + c$. Then find the initial velocity of the object.

1. $3\alpha t^2$
2. βt
3. γ
4. $3\alpha t^2 + \gamma$

Solution Correct Option **- 3**

Que. 23 The resistance of a motor is 90 Ω, resistance of bulb is 60 Ω, and a fan of resistance 30 Ω are connected in parallel to a 240 V source. Find the total value (approx) of current flowing through all appliances?

1. 15 A
2. 10 A
3. 5 A
4. 12 A

Solution Correct Option **- 1**

Que. 24 Which of the following is true with regard to the force of friction?

1. Static friction > kinetic friction < rolling friction
2. Static friction < kinetic friction < rolling friction
3. Static friction < kinetic friction > rolling friction
4. Static friction > kinetic friction > rolling friction

Solution Correct Option **- 4**

Que. 25 Choose the correct statement among the following with respect to microscope and telescope.

1. Telescope provides magnification, whereas microscope provides resolution
2. Telescope provides resolution whereas microscope provides magnification
3. Both provide resolution

4. Both provide magnification

Solution Correct Option **- 2**

Que. 26 Find the modulus of 5i where i = √-1

1. 0
2. 25
3. 4
4. 5

Solution Correct Option **- 4**

Que. 27 Evaluate $\int x^{1/3}\, dx$.

1. 1
2. $\frac{3}{4}x^{\frac{4}{3}} + C$
3. $\frac{4}{3}x^{\frac{4}{3}} + C$
4. None of these.

Solution Correct Option **- 2**

Que. 28 The value of $\lim_{x\to 1} \frac{\log x}{x-1}$ will be

1. 1
2. -1
3. 0
4. ∞

Solution Correct Option **- 1**

Que. 29 What is C(n, 1) + C(n, 2) + _ _ _ _ _ + C(n, n) equal to

1. $2 + 2^2 + 2^3 + \_ \_ \_ \_ \_ + 2^n$
2. $1 + 2 + 2^2 + 2^3 + \_ \_ \_ \_ \_ + 2^n$
3. $1 + 2 + 2^2 + 2^3 + \_ \_ \_ \_ \_ \_ + 2^{n-1}$
4. $2 + 2^2 + 2^3 + \_ \_ \_ \_ \_ + 2^{n-1}$

Solution Correct Option **- 3**

Que. 30 If X and Y are two sets, such that X ∪ Y has 40 elements, X has 28 elements and Y has 22 elements, how many elements does X ∩ Y have?

1. 30
2. 20
3. 10
4. 5

Solution Correct Option **- 3**

Que. 31 Find the 9^{th} term of the GP 3, 6, 12, 24, ...?

1. 624
2. 656
3. 768
4. None of these

Solution Correct Option **- 3**

Que. 32 If cos x = - 3 / 5 and x lies in the 3^{rd} quadrant then find the value of sin 2x?

1. 21 / 25
2. – 21 / 25
3. 24 / 25
4. – 24 /25

Solution Correct Option **- 3**

Que. 33 Find the area of the region bounded by the curves $y = x^3$, the line x = 2, x = 5 and the x - axis?

1. 173.50
2. 230.25
3. 175.35
4. 152.25

Solution Correct Option **- 4**

Que. 34 What is the radius and the center of the circle $2y^2 + 2x^2 + 12y = 32$

1. 5 and (3, 0)
2. 3 and (0, -3)
3. 5 and (0, -3)
4. 3 and (-3, 0)

Solution Correct Option **- 3**

Que. 35 At what point the line y = x + 1 is a tangent to the curve $y^2 = 4x$?

1. (1, -2)
2. (1, -2), (1, 2)
3. (1, 2)
4. None of these

Solution Correct Option **- 3**

Que. 36 If $f(x) = \log x^2$, where x > 1 find derivative of f(x)

1. $\frac{2}{x^2}$
2. $\frac{1}{x}$
3. $\frac{2}{x}$
4. $\frac{1}{x^2}$

Solution Correct Option - **3**

Que. 37 Evaluate the integral $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x}}{\sqrt{\tan x}+\sqrt{\cot x}} \mathrm{dx}$

1. $\frac{\pi}{6}$
2. $\frac{\pi}{2}$
3. $\frac{\pi}{4}$
4. None of the above

Solution Correct Option - **3**

Que. 38 Two letters are chosen from the letters of the word 'EQUATIONS'. The probability that one is vowel and the other is consonant is

1. $\frac{8}{9}$
2. $\frac{4}{9}$
3. $\frac{3}{9}$
4. $\frac{5}{9}$

Solution Correct Option - **4**

Que. 39 If the line y = mx + c is tangent to the parabola $y^2 = 4ax$, then which of the following is true about 'c'?

1. c = am
2. $c = \frac{m}{a}$
3. $c = \frac{a}{m}$
4. None of these.

Solution Correct Option - **3**

Que. 40 If the distance between the points (3, 4) and (a, 2) is 8 units then find the value of a

1. $3 \pm 2\sqrt{15}$
2. $2 \pm 2\sqrt{15}$
3. $1 \pm \sqrt{15}$
4. None of these

Solution Correct Option - **1**

Que. 41 Find the degree of the differential equation $y = x\frac{dy}{dx} + \left(\frac{dy}{dx}\right)^{-1}$

1. 1
2. -1
3. 2
4. None of these

Solution Correct Option - **3**

Que. 42 If $\tan\theta = \frac{4}{5}$, then what is the value of $\frac{4\sin\theta - 5\cos\theta}{4\sin\theta + 5\cos\theta}$?

1. 1
2. $\frac{9}{41}$
3. $\frac{8}{15}$
4. None of these.

Solution Correct Option **- 4**

Que. 43 If the angleθ is in the first quadrant and $\cot\theta = 1/\sqrt{3}$, then what is the value of $(\sin\theta + \cos\theta)$?

1. $(1 + \sqrt{3})$
2. $(\sqrt{3} - 1)/2$
3. $(1 - \sqrt{3})/2$
4. $(\sqrt{3} + 1)/2$

Solution Correct Option **- 4**

Que. 44 For $x \in \left(-\frac{3\pi}{2}, \frac{\pi}{2}\right)$, the expression $\cot^{-1}\left(\frac{1-\sin x}{\cos x}\right)$ can be simplified as:

1. $\frac{\pi}{4} + \frac{x}{2}$
2. $\frac{\pi}{4} - \frac{x}{2}$
3. tan x
4. tan (-x)

Solution Correct Option **- 1**

Que. 45 Evaluate: $\int_0^{\pi/4} e^{\tan x} \sec^2 x dx$

1. e
2. e - 1
3. 2e + 1
4. 0

Solution Correct Option **- 2**

Que. 46 Let n be the number of different 5 digits numbers, divisible by 4 that can be formed with the digits 1, 2, 3, 4, 5 and 6 , with no digit being repeated. What is the value of n?

1. 144
2. 168
3. 192
4. 222

Solution Correct Option **- 3**

Que. 47 The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$ is

1. x + y = c

2. xy = c
3. logx · logy = c
4. $\frac{1}{y}+\frac{1}{x}=c$

Solution Correct Option **- 2**

Que. 48 Find the value of x; $\begin{vmatrix} x & 1 & 2 \\ 2 & 0 & 3 \\ 4 & 5 & 6 \end{vmatrix} = 0$

1. 4/3
2. 2/3
3. 1/3
4. 5/3

Solution Correct Option **- 1**

Que. 49 What is the principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$?

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

Solution Correct Option **- 1**

Que. 50 If the vertex of the parabola $x = y^2 - 6y + c$ lies on y -axis, then the value of c is ?

1. 3
2. -3
3. -9
4. 9

Solution Correct Option **- 4**

Que. 51 Select the most appropriate antonym of the given word.
OUTSTANDING

1. Arrogant
2. Evident
3. Wonderful
4. Ordinary

Solution Correct Option **- 4**

Que. 52 **Directions: In the following question, some part of the sentence may have errors. Find out which part of the sentence has an error and select the appropriate option. If a sentence is free from error, select 'No Error'.**

Ramesh is smarter enough (A)/ to get selected for this post,(B)/ without any recommendations. (C)/ No Error (D)

1. A

2. B
3. C
4. D

Solution Correct Option **- 1**

Que. 53 **Choose the word which can be used to replace the group of words given.**

Anything which is no longer in use

1. Brawl
2. Escalate
3. Impinge
4. Obsolete

Solution Correct Option **- 4**

Que. 54 **Select the correctly spelt word.**

1. Haressment
2. Harrassment
3. Harrasment
4. Harassment

Solution Correct Option **- 4**

Que. 55 **Direction: Select the segment of the sentence that contains the grammatical error. If there is no error, mark 'No error' as your answer.**

If you had told me before, (A)/ I would definitely come to (B)/ pick you up from the airport. (C)/ No error (D)

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

Solution Correct Option **- 2**

Que. 56 **Select the correct passive form of the given sentence.**

Shut the door.

1. Let the door be shutted.
2. Let us shut the door.
3. Let me shut the door.
4. Let the door be shut.

Solution Correct Option **- 4**

Que. 57 **Directions - Read the passage given below and answer all the questions that follow.**

However, nowadays, the importance of vocabulary as also learning a language has become more accepted. Vocabulary is a basic component of language proficiency which provides the basis for learners 'performance in other skills, such as speaking, reading, listening and writing. (Nation, 2008) Therefore, acquiring vocabulary it is a fundamental process when learning an L2 because it will not only develop the writing skills, but also the remaining ones. As a consequence, learners will become competent on their level of

language because it seems that the four skills will be hand in hand. Between many forms or learning vocabulary, it is the possibility of learning vocabulary incidentally. Hunt and Beglar (1998) point out that “many vocabularies are learned incidentally through extensive reading and listening”. For this reason, motivating learners to read and listen extensively can provide them with great opportunities to learn new vocabularies.

Vocabulary is a basic component of?

1. Language Proficiency
2. Grammar Proficiency
3. English Proficiency
4. Fundamental Proficiency

Solution Correct Option **- 1**

Que. 58 Vocabulary provides the basis for learners' performance in which skills?

1. Dancing, singing, reading, writing
2. speaking, reading, listening and writing
3. speaking, reading, listening and singing
4. speaking, reading, listening and dancing

Solution Correct Option **- 2**

Que. 59 According to Hunt and Begler, how are many vocabularies learnt incidentally?

1. Through extensive reading and writing
2. Through extensive writing and speaking
3. Through extensive reading and listening
4. Through extensive reading and speaking

Solution Correct Option **- 3**

Que. 60 **<u>Direction</u>: Find out which part has an error and mark it as your answer. If there is no error, mark 'No error' as your answer.**

Half of (A)/ the apples (B)/ was rotten. (C)/ No error (D)

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

Solution Correct Option **- 3**

Que. 61 **Direction: Choose the correct spelling of the word among the following:**

1. Remittance
2. Remattance
3. Remattanse
4. Ramattance

Solution Correct Option **- 1**

Que. 62 **Direction: Fill in the blank with the correct answer:**

Roshan doesn't listen _____ of his parents.

1. either
2. each
3. neither
4. every

Solution Correct Option **- 1**

Que. 63 **Direction:** Noun form of **'Assert'** is _____.

1. Asserted
2. Asserting
3. Assertion
4. None of these

Solution Correct Option **- 3**

Que. 64 **Direction: Change the Narration-**

The teacher said, "The Earth goes around the Sun."

1. The teacher said that the Earth went around the Sun.
2. The teacher said that the Earth is going around the Sun.
3. The teacher said that the Earth go around the Sun.
4. The teacher said that the Earth goes around the Sun.

Solution Correct Option **- 4**

Que. 65 **Direction: Select the option that is opposite in meaning to the given word and mark your response accordingly.**

Resist

1. support
2. oppose
3. avoid
4. cancel

Solution Correct Option **- 1**

Que. 66 **Direction: Change the Voice-**

Was he writing a letter?

1. Was a letter being written by him?
2. Were a letter being written by him?
3. Is a letter being written by her?
4. Was a letter being written by her?

Solution Correct Option **- 1**

Que. 67 **Direction: Choose the most appropriate phrasal verb and fill in the blank:**

His novel was _____ by publisher after publisher.

1. called on

2. calmed down
3. turned down
4. dressed up

Solution Correct Option **- 3**

Que. 68 **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.**

He didn't eat the apple (A) / because it tasted bitterly (B) / and was slightly rotten. (C) / No error (D)

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

Solution Correct Option **- 2**

Que. 69 **Direction: Select the option that is similar in meaning to the given word and mark your response accordingly.**

Adaptive

1. Stubborn
2. Usual
3. Fixed
4. Flexible

Solution Correct Option **- 4**

Que. 70 **Direction: Change into the interrogative form:**

There is nothing better than a busy life.

1. Is there anything better than a busy life?
2. Was there anything better than a busy life?
3. Are there anything better than a busy life?
4. Is there nothing better than a busy life?

Solution Correct Option **- 1**