Airforce Group X

Previous Year Paper

MBT 14-Jul-2021 Shift 1

70 Questions

Que. 1 The relation between the electric field and the magnetic field is

1. $\mu_o\epsilon_o$
2. $\frac{1}{\mu_o\epsilon_o}$
3. $\frac{1}{\sqrt{\mu_o\epsilon_o}}$
4. $\sqrt{\mu_o\epsilon_o}$

Solution Correct Option **- 3**

Que. 2 The source temperature of the Carnot engine is 727°C. Find the efficiency of the engine if the sink temperature is 27 °C.

1. 50%
2. 70%
3. 30%
4. 75%

Solution Correct Option **- 2**

Que. 3 A satellite moving in a circular orbit around earth has a total (kinetic + potential) energy E_o. Its potential energy will be ____

1. $2E_o$
2. E_o
3. $E_o/4$
4. $E_o/2$

Solution Correct Option **- 1**

Que. 4 A particle has an initial velocity of 30 m/s due east and a constant acceleration of 10 m/s^2 due west. The distance covered by the particle in the one second of its motion is:

1. 10 m
2. 20 m
3. 25 m
4. 35 m

Solution Correct Option **- 3**

Que. 5 The value of 1 picometer is _____

1. 10^{-6} micron
2. 10^6 micton
3. 10^{-3} micron
4. 10^3 micron

Solution Correct Option **- 1**

Que. 6 The energy stored in a 50 mH inductor carrying a current of 4 A will be

1. 0.4 J
2. 4.0 J
3. 0.8 J
4. 0.04 J

Solution Correct Option **- 1**

Que. 7 The magnitude of the force on a charge Q in the electric field E is:

1. E/Q
2. Q/E
3. EQ
4. E^2Q

Solution Correct Option **- 3**

Que. 8 A liquid drop tends to assume a spherical shape because of

1. Centrifugal force
2. Surface tension
3. Gravitational force
4. Viscous force

Solution Correct Option **- 2**

Que. 9 Which of the following essential condition is necessary to take place for Isothermal Process?

1. The wall of the container must be perfectly conducting to takes place an Isothermal Process.
2. The process of expansion and compression should be very slow in a conducting container to takes place in an Isothermal Process.
3. In this thermodynamics process temperature should be remains constant.
4. All of the above

Solution Correct Option **- 4**

Que. 10 The work done in carrying a charge q once around a circle of radius r with a charge Q placed at the center will be

1. $Qq(4\pi\varepsilon_0 r^2)$
2. $Qq/(4\pi\varepsilon_0 r)$
3. zero
4. $Qq^2/(4\pi\varepsilon_0 r)$

Solution Correct Option **- 3**

Que. 11 Zener Diode is mostly used as _____.

1. Half-wave rectifier

2. Full-wave rectifier
3. Voltage Regulator
4. LED

Solution Correct Option **- 3**

Que. 12 What is the unit of static friction?

1. MLT^{-2}
2. ML^2T^{-2}
3. $ML^{-2}T^{-2}$
4. Unitless

Solution Correct Option **- 4**

Que. 13 The force between the two charges is F. If the distance between the two charges is halved keeping the magnitude of the charges same, then the force between the charges will be:

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

Solution Correct Option **- 4**

Que. 14 A wire of resistance 'R' is cut into '10' equal parts. These parts are then connected into parallel. The equivalent resistance value will be _____.

1. 10R
2. $10/R^2$
3. R/100
4. R/10

Solution Correct Option **- 3**

Que. 15 Which of the following is not an example of simple harmonic motion?

1. motion of a swing
2. motion when bungee jumping
3. motion of the blades of fan
4. All of the above are example of simple harmonic motion

Solution Correct Option **- 3**

Que. 16 If a liquid does not wet a solid surface, then its angle of contact is:

1. acute angle
2. obtuse angle
3. right angle
4. none of these

Solution Correct Option **- 2**

Que. 17 The cross sectional area of an aluminum square rod is 5×10^{-3} m^2 and length is 1 m. If the resistivity of the aluminum is 2.8×10^{-8} Ωm, resistance will be :

1. 11.2×10^{-6} Ω
2. 5.6×10^{-6}Ω
3. 2.42×10^{-5}Ω
4. 11.4×10^{-5}Ω

Solution Correct Option **- 2**

Que. 18 The power of a lens is +2.5 D. What kind of lens is it and what is its focal length?

1. Convex lens, 40 cm
2. Concave lens, 100 cm
3. Convex lens, 50 cm
4. Concave lens, 40 cm

Solution Correct Option **- 1**

Que. 19 Which radiation has the highest penetrating power?

1. Alpha radiation
2. Beta radiation
3. Gamma radiation
4. All have the same penetrating power

Solution Correct Option **- 3**

Que. 20 A charge particle is moving with a constant velocity then which of the following is correct statement?

1. It only produced an electric field around it
2. It creates both magnetic field and electric field around it
3. It creates electromagnetic wave
4. All are wrong

Solution Correct Option **- 2**

Que. 21 In the Young's double slit experiment, the width ratio of slit is 1 : 4 . Find the ratio of amplitude of light waves coming from them.

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

Solution Correct Option **- 3**

Que. 22 A gas of 240 ml is heated from 27°C to 227° C. What will be it's new volume (in ml) if pressure is constant?

1. 300
2. 144

3. 288
4. 400

Solution Correct Option **- 4**

Que. 23 A monoatomic molecule constrained to move in a plane has _____ translational degrees of freedom.

1. three
2. zero
3. two
4. one

Solution Correct Option **- 3**

Que. 24 Two charges are placed in vacuum at a distance 'r' apart. The force between them is 'F'. If a copper is introduced between them, the force will be:

1. F
2. 2F
3. Zero
4. Infinity

Solution Correct Option **- 3**

Que. 25 When a charged particle moves perpendicular to a magnetic field, then which statement is correct:

a) Its momentum remains constant

b) Its kinetic energy remains constant

c) Its velocity remains constant

1. Only a is correct
2. Only b is correct
3. Only c is correct
4. All a, b and c are correct

Solution Correct Option **- 2**

Que. 26 Integrate: $\int \log x \, dx$.

1. $x (\log x + 1) + C$
2. $\log x - x + C$
3. $\frac{1}{x} + C$
4. $x (\log x - 1) + C$

Solution Correct Option **- 4**

Que. 27 Evaluate $\int_0^{\pi/4} \frac{\sin^3 x}{\cos^5 x} dx$

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

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

Solution Correct Option **- 3**

Que. 28 The motion of a particle is described by, $S = t^3 - 4t^2 + 8$,where s is the displacement and t is time (in sec). Find the value of velocity (in unit/sec)when there is no acceleration of the particle?

1. $\frac{16}{3}$
2. $\frac{8}{3}$
3. $-\frac{8}{3}$
4. $-\frac{16}{3}$

Solution Correct Option **- 4**

Que. 29 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. 30 If the curve $ay + x^2 = 7$ and $x^3 = y$, cut orthogonally at (1, 1) then the value of a is

1. 1
2. 0
3. 6
4. None of these

Solution Correct Option **- 3**

Que. 31 If $y = a \cos 2x + b \sin 2x$, then

1. $\frac{d^2y}{dx^2} + y = 0$
2. $\frac{d^2y}{dx^2} + 2y = 0$
3. $\frac{d^2y}{dx^2} - 4y = 0$
4. $\frac{d^2y}{dx^2} + 4y = 0$

Solution Correct Option **- 4**

Que. 32 If A and B are two independent event such that P(A) = 1/2, and P(B) = 1/5, then which is NOT true?

1. P(AUB) = 3/5
2. P(A/B) = 1/2
3. P(A/AUB) = 1/6
4. P(A∩B/A'UB') = 0

Solution Correct Option **- 3**

Que. 33 Given the sets A = {2, 3, 4, 5, 6, 7}, B = {6, 7, 8} and c= {1, 5, 8, 9} then find A ∩ (B U C) and number of elements in A ∩ (B U C)

1. {6, 7, 8}, 3
2. {5, 6, 7}, 3
3. {4, 5, 6,7}, 4
4. {4, 5, 6}, 3

Solution Correct Option **- 2**

Que. 34 The equation $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$ has

1. no solution
2. unique solution
3. two solutions
4. infinite number of solutions

Solution Correct Option **- 2**

Que. 35 If $x + 2y = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$ and $2x + 5y = \begin{bmatrix} 7 & 5 \\ 2 & 3 \end{bmatrix}$, then y is equal to ?

1. $\begin{bmatrix} 3 & 11 \\ 0 & 7 \end{bmatrix}$
2. $\begin{bmatrix} 3 & 5 \\ 0 & -7 \end{bmatrix}$
3. $\begin{bmatrix} 3 & 11 \\ 0 & -7 \end{bmatrix}$
4. $\begin{bmatrix} 3 & 5 \\ 0 & 7 \end{bmatrix}$

Solution Correct Option **- 3**

Que. 36 Find the integral factor of $\frac{dy}{dx} + \frac{y}{x} = 3\sin x$

1. e^x
2. x
3. $e^{(1/x)}$
4. none of these

Solution Correct Option **- 2**

Que. 37 How many words can be formed using all the letters of the word 'NATION' so that all the three vowels should never come together?

1. 354
2. 348
3. 288
4. None of the above

Solution Correct Option **- 3**

Que. 38 Find the value of k if |A| = k such that $A = \begin{bmatrix} 2\cos x & -2\sin x \\ \sin x & \cos x \end{bmatrix}$?

1. 2
2. 1
3. 0
4. None of these

Solution Correct Option **- 1**

Que. 39 Find the median of the given set of numbers 4, 6, 3, 8, 5, 2, 7, 9

1. 6.5
2. 5.5
3. 5
4. 6

Solution Correct Option **- 2**

Que. 40 Let $Z_1 = 1 + i$ and $Z_2 = 2 + 3i$

Find the modulus of $\frac{Z_1}{Z_2}$?

1. $\frac{\sqrt{27}}{13}$
2. $\frac{\sqrt{26}}{13}$
3. $\frac{\sqrt{23}}{13}$
4. $\frac{\sqrt{21}}{13}$

Solution Correct Option **- 2**

Que. 41 Find $\frac{dy}{dx}$, if $y = \tan^{-1}\left[\frac{8x}{1-15x^2}\right]$

1. $\frac{5}{1+25x^2} - \frac{3}{1+9x^2}$
2. $\frac{5}{1+25x^2} + \frac{3}{1+9x^2}$
3. $\frac{8}{1+25x^2}$
4. None of these

Solution Correct Option **- 2**

Que. 42 Find the equation of line parallel to the line 3x - 2y = 4 and passing through (1, 5)

1. 3x - 2y + 7 = 0
2. 3x + 2y - 13 = 0
3. 2x + 3y - 17 = 0
4. 2x - 3y + 12 = 0

Solution Correct Option **- 1**

Que. 43 Find the radius and center of the circle $x^2 + y^2 - 4x - 6y - 12 = 0$

1. Radius = 5, Center = (2, 3)
2. Radius = 5, Center = (3, 2)
3. Radius = 1, Center = (2, 3)
4. Radius = 1, Center = (3, 2)

Solution Correct Option **- 1**

Que. 44 Find equation of directrix of parabola, $x^2 = -22y$.

1. 2y - 11 = 0
2. 2x - 11 = 0
3. 2x + 11 = 0
4. 2y + 11 = 0

Solution Correct Option **- 1**

Que. 45 A man running round a racecourse notes that the sum of the distance of two flag-posts from him is always 10 m and the distance between the flag-posts is 8 m. The area of the path he encloses is

1. 18π square metres
2. 15π square metres
3. 12π square metres
4. 8π square metres

Solution Correct Option **- 2**

Que. 46 If A is an invertible matrix of order n and k is any positive real number, then the value of $[\det(kA)]^{-1}$ det A is

1. k^{-n}
2. k^{-1}
3. k^{n}
4. nk

Solution Correct Option **- 1**

Que. 47 The area of the parallelogram whose diagonals are $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$ is:

1. $10\sqrt{3}$
2. $5\sqrt{3}$
3. $10\sqrt{2}$
4. $5\sqrt{2}$

Solution Correct Option **- 2**

Que. 48 Find the coefficient of x^{11} in the expansion of $(x^3 - \frac{1}{x^4})^{13}$.

1. -143
2. -572

3. 143
4. 715

Solution Correct Option **- 4**

Que. 49 If sinA = 4/5 and cosB = 3/5, then the value of sinA cosB - sinB cosA is:

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

Solution Correct Option **- 2**

Que. 50 Evaluate: $\int \frac{e^{\tan^{-1}x}}{1+x^2}\ dx$

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

Solution Correct Option **- 2**

Que. 51 **Choose the correct antonym for the word given below:**

Adversity

1. Affliction
2. Advertise
3. Contentment
4. Adamant

Solution Correct Option **- 3**

Que. 52 **Directions: Select the wrongly spelt word.**

1. Receive
2. Receide
3. Receivable
4. Receipt

Solution Correct Option **- 2**

Que. 53 **Directions: Select the correctly spelt word.**

1. Complaynt
2. Complaint
3. Comepleint
4. Compleint

Solution Correct Option **- 2**

Que. 54 **Select the word which means the same as the group of words given.**

A building where grain is kept or stored

1. Greenery
2. Granary
3. Grate
4. Grandstand

Solution Correct Option **- 2**

Que. 55 **<u>Direction</u>: Read the passage given below and answer the question that follows:**

Women empowerment is when women have the freedom and choice to make their own decisions. They have the most **potent** right in deciding what's right for them and what's wrong for them. Women have suffered through the decades because they didn't have any rights. They suffered at the hands of their male counterparts. Women empowerment is one of the most critical and essential things that everyone should support. It is when women are given the most power and right to make decisions for themselves. Women have been subjected to injustice for decades. They have been treated as non-existent for decades. This is one of the biggest reasons for women's empowerment. It was one of the essential things which were the need of the hour. Women were made aware of their rights. Along with their rights, women were taught how to be self-independent in all aspects of their lives. They were taught how to create a space for them where they can grow and become the people they want to be. The men always had all the rights. However, the women didn't have any of these rights, even a small right like voting. Things changed when women realized that they, too, need equal rights. This brought along the revolution by the women demanding their rights. It spread the awareness that gender shouldn't be the reason that things go in their favour.

What is the theme of the passage?

1. Women empowerment
2. Women inequality
3. Gender awareness
4. Self- dependence of women

Solution Correct Option **- 1**

Que. 56 What is the awareness spread by this passage?

1. things that go in any one's favor depends on climatic conditions
2. women have been treated as non-existent for decades
3. gender should be the reason that things go in their favor
4. gender shouldn't be the reason that things go in their favor

Solution Correct Option **- 4**

Que. 57 What is the biggest reason for women's empowerment?

1. Women were not allowed to go outside
2. Women were instructed not to do jobs
3. Women were compelled to do multiple house-hold works
4. Women have been subjected to injustice and treated as non-existent for decades

Solution Correct Option **- 4**

Que. 58 Which of the following words could replace the word **'potent'** as used in the passage?

1. ineffective
2. feeble
3. peaceful
4. powerful

Solution Correct Option **- 4**

Que. 59 **Select the most appropriate meaning of the given idiom.**

Have an Axe to Grind

1. To have a dispute with someone
2. Quickly doing things results in a poor ending
3. Deteriorating and headed for complete disaster
4. Angry and overcome by emotions

Solution Correct Option **- 1**

Que. 60 **Direction: Choose the correct spelling of the word among the following:**

1. Investigation
2. Circamference
3. Surraundings
4. Punchual

Solution Correct Option **- 1**

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

1. Occupey
2. Circomference
3. Punctul
4. Occupy

Solution Correct Option **- 4**

Que. 62 **Direction: Verb** form of **'Obedience'** is _____.

1. Obedient
2. Obey
3. Obeyingly
4. None of these

Solution Correct Option **- 2**

Que. 63 **Direction: Change the Narration-**

The station master said to me, "The train is two hours late."

1. The station master told me that the train is two hours late.
2. The station master says me that the train was two hours late.
3. The station master told me that the train was being two hours late.
4. The station master told me that the train was two hours late.

Solution Correct Option **- 4**

Que. 64 **<u>Direction</u>: Select the option that is similar in meaning to the given word and mark your response accordingly.**

Cautiously

1. Prudently
2. Recklessly
3. Politely
4. Rashly

Solution Correct Option **- 1**

Que. 65 **Direction: Choose the appropriate word for the given sentence:**

He has been out of the office since you last _____.

1. phoned
2. will phone
3. have phone
4. had phoned

Solution Correct Option **- 1**

Que. 66 **Direction: Choose the correct group of words that replace the given word.**

The place where horses are kept

1. Kennel
2. Stable
3. Cattery
4. None of these

Solution Correct Option **- 2**

Que. 67 **Direction: Choose the appropriate answer for the given sentence:**

Ashok was able to rule _____ the vast and diverse Mauryan empire.

1. over
2. of
3. after
4. None of thesse

Solution Correct Option **- 1**

Que. 68 **<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.**

He was debarred to attend / the monsoon session / of the parliament./ No error

1. He was debarred to attend
2. the monsoon session
3. of the parliament
4. No error

Solution Correct Option **- 1**

Que. 69 **<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.**

The patient would / have died / when the doctor had not come in time./ No error

1. The patient would
2. have died
3. when the doctor had not come in time
4. No error

Solution Correct Option **- 3**

Que. 70 **<u>Direction</u>: Choose the most appropriate word and fill in the blank:**

He said, "Don't _____ me when I'm talking to you."

1. will interrupt
2. had interrupted
3. has interrupted
4. interrupt

Solution Correct Option **- 4**