

**Airforce
Group X**

**Previous Year Paper
MBT 18-Jul-2021 Shift 3**

70 Questions

Que. 1 The dimensional formula for angular momentum is

1. $[M^1L^2T^{-2}]$
2. $[M^1L^2T^{-1}]$
3. $[M^0L^2T^{-2}]$
4. $[M^1L^1T^{-1}]$

Solution Correct Option - 2

Que. 2 n-type semiconductor is:

1. positively charged
2. neutral
3. negatively charged
4. none of these

Solution Correct Option - 2

Que. 3 Which among the following statements is true about Huygen's principle

1. Each point on a wavefront is a source of secondary waves
2. Each point on a wavefront is a sink of secondary waves
3. No point on a wavefront is a source of secondary waves
4. None of the above

Solution Correct Option - 1

Que. 4 In a series RLC circuit, the values of R, L, and C are 1000Ω , 4 H, and 10^{-6} F respectively. What will happen to the resonant frequency of the circuit if the value of R is decreased by 20Ω ?

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

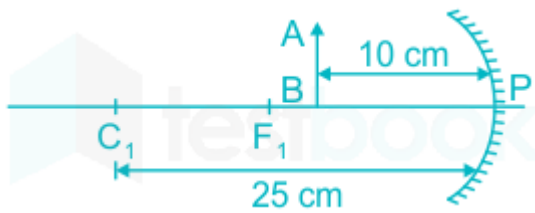
Solution Correct Option - 4

Que. 5 The heat given to a thermodynamic system is 1 kCal and work done by the system is 200 J. Find the change in internal energy of the system.

1. 1000 J
2. 2000 J
3. 4000 J
4. 3000 J

Solution Correct Option - 3

Que. 6 refer to following diagram to calculate how far (in cm) will the image be formed from the mirror. AB is the object.



1. 40
2. 25
3. 50
4. 30

Solution Correct Option - 3

Que. 7 A force $\vec{F} = (5\hat{i} + 3\hat{j})$ newton displaces a body by $(2\hat{i} - \hat{j})$ metre. The work done by the force is:

1. Zero
2. 12 Joules
3. 7 Joules
4. 13 Joules

Solution Correct Option - 3

Que. 8 If temperature of the source is increased, the efficiency of Carnot engine

1. Increases
2. Decreases
3. Remains Constant
4. First increases and then becomes constant

Solution Correct Option - 1

Que. 9 If the radius of earth is reduced by 2/3rd of its initial value keeping its mass constant, then acceleration due to gravity becomes-

1. 4/9
2. 9/4
3. 2/3
4. 3/2

Solution Correct Option - 2

Que. 10 A body executing simple harmonic motion has an amplitude of 0.01 m and a frequency of 50 Hertz. The ratio of the magnitude of maximum acceleration and maximum velocity of the body is

1. 25π
2. 50π
3. 100π
4. 200π

Solution Correct Option - 3

Que. 11 If ΔU is the increase in internal energy and W is the work done by a system, then which of the following statements is true?

1. $\Delta U = W$ in an adiabatic process
2. $\Delta U = -W$ in an isothermal process
3. $\Delta U = -W$ in an adiabatic process
4. $\Delta U = W$ in an isothermal process

Solution Correct Option - 3

Que. 12 The viscous force between the layers of a liquid does NOT depend on which of the following?

1. Contact area of the layers
2. Nature of the liquid
3. Velocity gradient
4. Density of the liquid

Solution Correct Option - 4

Que. 13 What is the SI unit of resistivity?

1. Ohm-meter
2. Ohm-meter²
3. Ohm
4. mho/m

Solution Correct Option - 1

Que. 14 Three capacitances of $4\mu\text{F}$, $6\mu\text{F}$ and $12\mu\text{F}$ are connected (I) in series and then (II) in parallel. The ratio of equivalent capacitance in case (I) to that in case (II) is:

1. 1 : 11
2. 11 : 1
3. 1 : 1
4. 1 : 3

Solution Correct Option - 1

Que. 15 An object is moving in a circle with uniform angular speed. If the radius of the circle is doubled, then its centripetal acceleration will

1. be tripled
2. be quadrupled
3. be doubled
4. remain the same

Solution Correct Option - 3

Que. 16 The dimensional formula of constant a in van der Waals gas equation $(p + \frac{a}{V^2})(V - b) = RT$ is:

1. $[\text{ML}^3\text{T}^{-2}]$
2. $[\text{ML}^5\text{T}^{-2}]$

3. $[ML^2T^{-1}]$

4. $[ML^2T^{-5}]$

Solution Correct Option - 2

Que. 17 The angle of incidence for a light ray falling on a plane mirror is 30° . Find the angle of deviation of this light ray.

1. 30°
2. 60°
3. 120°
4. 180°

Solution Correct Option - 3

Que. 18 The displacement of a particle is given by

$$x = 2 + 5t + 3t^2$$

What will be the magnitude and its initial velocity?

1. 6 m/s
2. 2 m/s
3. 5 m/s
4. None of the above

Solution Correct Option - 3

Que. 19 The magnetic field intensity at the center of the circular coil depends on the:

1. Current in the coil
2. Number of turns
3. Radius of the coil
4. All of these

Solution Correct Option - 4

Que. 20 Identify the logic gate?



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

Solution Correct Option - 4

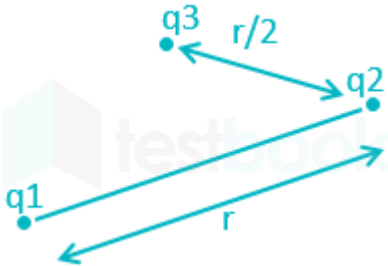
Que. 21 Choose the correct statement from the following.

1. Electromagnetic waves can travel in a vacuum
2. The electric and magnetic field of an electromagnetic wave are always in phase

3. Accelerated charges produce electromagnetic waves
4. All of the above

Solution Correct Option - 4

Que. 22 Two charges q_1 and q_2 are placed as shown in the figure. The force exerted by q_1 on q_2 is F_{12} . When a new charge q_3 is brought nearby, the magnitude of F_{12} will be



1. 3 times greater
2. reduces to half
3. same
4. increases

Solution Correct Option - 3

Que. 23 When light passes through a glass slab, the property of light that changes is/are

1. Frequency
2. Wavelength
3. Both frequency and wavelength
4. There is no change in the property of the lightwave

Solution Correct Option - 2

Que. 24 A cup of water is filled to the brim, with an ice cube in it. The top of the ice cube sticks out of the surface. What happens when the ice melts?

1. the cup overflows
2. the water level remains the same
3. the water level decreases
4. none of the above

Solution Correct Option - 2

Que. 25 The statement "The loss of weight of a body submerged (partially or fully) in a fluid is equal to the weight of the fluid displaced" represents which of the following?

1. Archimedes' principle
2. Boyle's law
3. Pascal's Law
4. Bernoulli's principle

Solution Correct Option - 1

Que. 26

If $x = A \cos 4t + B \sin 4t$, then $\frac{d^2 x}{dt^2}$ is equal to -

1. $-16x$
2. $16x$
3. x
4. $-x$

Solution Correct Option - 1

Que. 27 $\int_0^1 \frac{1}{1+x^2} dx =$

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

Solution Correct Option - 1

Que. 28 Find the value of $\int \operatorname{cosec}^2 x \, dx$

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

Solution Correct Option - 2

Que. 29 If $f(x) = \frac{\sin x}{x}$, where $x \in \mathbf{R}$, is to be continuous at $x = 0$, then the value of the function at $x = 0$

1. should be 0
2. should be 1
3. should be 2
4. cannot be determined

Solution Correct Option - 2

Que. 30 Three numbers 3, q and 5 are in arithmetic progression if $q = ?$

1. 4
2. 5
3. 3
4. None of these

Solution Correct Option - 1

Que. 31 From a pack of playing card, one card is drawn randomly. What is the probability that the card is red color or king?

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

2. $\frac{1}{26}$
3. $\frac{3}{13}$
4. $\frac{7}{13}$

Solution Correct Option - 4

Que. 32 $C(n, r-1) + 2C(n, r-2) + C(n, r-3) = ?$

1. $C(n+1, r)$
2. $C(n+2, r)$
3. $C(n+2, r-1)$
4. $C(n+1, r-1)$

Solution Correct Option - 3

Que. 33 Find the equation of the tangents to the parabola $y^2 = 4x$, which also passes from the point (3, 4).

1. $y = x + 1$ & $y = \frac{x}{3} + 3$
2. $y = 5x - 11$ & $y = \frac{2x}{3} + 2$
3. $y = 3x - 5$ & $y = \frac{5x}{3} - 1$
4. $y = 2x - 2$ & $y = \frac{8x}{3} - 4$

Solution Correct Option - 1

Que. 34 Find the approximate value of $f(3.01)$, where $f(x) = 3x^2 + 3$.

1. 30.18
2. 30.018
3. 30.28
4. 30.08

Solution Correct Option - 1

Que. 35 The value of $\sin(\cot^{-1}x)$ is:

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

Solution Correct Option - 3

Que. 36 If $y = e^{2x}$ then $\frac{d^2y}{dx^2}$ is equal to ?

1. y
2. $2y$
3. $4y$

4. $6y$

Solution Correct Option - 3

Que. 37 If $x = t^2$ and $y = t^3$, then $\frac{d^2y}{dx^2} = ?$

1. 0
2. t
3. \sqrt{t}
4. $\frac{3}{4t}$

Solution Correct Option - 4

Que. 38 If $a + ib$ is the conjugate of $5 + 11i$ then $a + b = ?$

1. 6
2. -6
3. 5
4. -5

Solution Correct Option - 2

Que. 39 The tenth term common to both the A. P. 3, 7, 11, ... and 1, 6, 11, ... is:

1. 171
2. 191
3. 211
4. None of these.

Solution Correct Option - 2

Que. 40 The Coefficient of T_{14} of the expression $(\sqrt{x} + \sqrt{y})^{17}$ will be

1. ${}^{17}C_{14}$
2. ${}^{17}C_3$
3. ${}^{17}C_5$
4. ${}^{17}C_{13}$

Solution Correct Option - 4

Que. 41 Construct a 3×2 matrix whose elements are given by $a_{ij} = \frac{1}{3} |2i + j|$

1. $\begin{bmatrix} 1 & \frac{5}{3} \\ \frac{4}{3} & 2 \\ \frac{7}{3} & \frac{8}{3} \end{bmatrix}$
2. $\begin{bmatrix} 1 & \frac{4}{3} \\ \frac{7}{3} & 2 \\ \frac{5}{3} & \frac{8}{3} \end{bmatrix}$

3.
$$\begin{bmatrix} 1 & \frac{4}{3} \\ \frac{5}{3} & 2 \\ \frac{8}{3} & \frac{7}{3} \end{bmatrix}$$

4.
$$\begin{bmatrix} 1 & \frac{4}{3} \\ \frac{5}{3} & 2 \\ \frac{7}{3} & \frac{8}{3} \end{bmatrix}$$

Solution Correct Option - 4

Que. 42 Area of the triangle having the coordinates (4, 2), (-1, 2) and (3, a) is 10 sq. units. Find the value of 'a'.

1. -2
2. 2
3. 6
4. 8

Solution Correct Option - 1

Que. 43 Determine the value of λ if planes $2x + 4y - 4z = 6$ and $\lambda x + 3y + 9 = 0$ make an angle of $\cos^{-1} \left(\frac{1}{\sqrt{2}} \right)$.

1. 1, $\frac{4}{7}$
2. 2, $\frac{2}{7}$
3. 3, $\frac{3}{7}$
4. 2, $\frac{3}{7}$

Solution Correct Option - 3

Que. 44 Find the degree and order of given equation $\frac{dy}{dx} = -a \cos x$?

1. 1, 2
2. 2, 2
3. 1, 3
4. 1, 1

Solution Correct Option - 1

Que. 45 If three vectors \vec{a} , \vec{b} and \vec{c} are represented by $\hat{i} + 2\hat{j} + 2\hat{k}$, $2\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} - \hat{j} + \hat{k}$ then the value of $(\vec{a} - 2\vec{b}) \cdot (2\vec{a} - \vec{c})$ will be:

1. 13
2. 19
3. 17
4. None of these

Solution Correct Option - 3

Que. 46

Evaluate: $\lim_{x \rightarrow 3} \left(\frac{x^2 - 9}{x - 3} \right)$

1. -3
2. 3
3. 6
4. 9

Solution Correct Option - 3

Que. 47 Which of the following points lies outside the circle $x^2 + y^2 - 2x + 6y + 1 = 0$?

1. (-1, -5)
2. (1, -5)
3. (-2, -6)
4. (2, -5)

Solution Correct Option - 3

Que. 48 General solution of differential equation $\frac{dy}{dx} + y = 1$, ($y \neq 1$), is:

1. $\log \left| \frac{1}{1-y} \right| = x + C$
2. $\log |1 - y| = x + C$
3. $\log |1 + y| = x + C$
4. $\log \left| \frac{1}{1-y} \right| = -x + C$

Solution Correct Option - 1

Que. 49 If $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots \infty}}}$, then $\frac{dy}{dx}$ is

1. 1
2. $\frac{1}{xy}$
3. $\frac{1}{2y-x}$
4. $\frac{1}{2y-1}$

Solution Correct Option - 4

Que. 50 The equation of the locus of a point equidistant from the point A(2, 3) and B(-1, 2) is

1. $2x + 6y = 8$
2. $6x + 2y = 8$
3. $x + y = 8$
4. $6x - 2y = 8$

Solution Correct Option - 2

Que. 51 **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

Que. 52 Select the most appropriate antonym of the given word.

Delay

1. Retard
2. Hinder
3. Hurry
4. Obstruct

Solution Correct Option - 3

Que. 53 Directions. Select the "Noun" form of the given verb from the following options.

Admire

1. Admirable
2. Admiration
3. Admirably
4. None of the above

Solution Correct Option - 2

Que. 54 Identify the segment in the sentence which contains a grammatical error.

Miss Marple is neither a good singer or a good stage artist.

1. stage artist
2. neither a good singer
3. or a good
4. Miss Marple is

Solution Correct Option - 3

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

Goyal flagged off the train through video conferencing and during the ceremony, he expressed his gratitude to the railway employees who served the country during the Covid-19 pandemic by supplying medicines, coal and other essential items. Railway Minister Piyush Goyal on Wednesday flagged off Siddhabali Jan Shatabdi Special Train that will run between Kotdwar in Uttarakhand and Delhi junction. He said the Kotdwar-Delhi route electrification is almost complete with only around a 15 km stretch pending which is expected to be completed by this month. "After this, trains on electric traction will **ply** from Kotdwar to Delhi. It will also save the environment. Going forward all the trains will run on electric traction in the entire Uttarakhand. This will ensure net-zero carbon emission and protection of the environment in the state," the minister said.

What is the theme of the passage?

1. Trains between Kotdwar and Delhi
2. Flagging off the Siddhabali Jan Shatabdi Special Train

3. Electric traction
4. Zero carbon emission

Solution Correct Option - 2

Que. 56 Siddhabali Jan Shatabdi Special Train will run between which stations?

1. Kotdwar and Kanpur
2. Kotdwar and Delhi
3. Kotdwar and Mumbai
4. Kotdwar and Agra

Solution Correct Option - 2

Que. 57 The electric traction will ensure:

1. net-zero Carbon emission
2. net-zero Oxygen emission
3. net-zero Nitrogen emission
4. net-zero Sulphur emission

Solution Correct Option - 1

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

1. settle
2. join
3. organize
4. travel

Solution Correct Option - 4

Que. 59 In the following question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.

Call it a day

1. Someone who is not being realistic
2. To start doing something
3. To stop doing something for the day
4. To take steps towards achieving peace with an enemy

Solution Correct Option - 3

Que. 60 Select the correctly spelt word.

1. Enterpreneur
2. Entrepreneur
3. Enterprenure
4. Entreorenuere

Solution Correct Option - 2

Que. 61 Direction: Fill in the blank with the most appropriate option.

_____ If I _____ an officer in the Archeological Survey of India, I would visit many historical monuments.

1. was
2. were been
3. am
4. were

Solution Correct Option - 4

Que. 62 **Direction: Choose the incorrect word among the followings:**

1. Hinderance
2. Honour
3. Headache
4. Hieght

Solution Correct Option - 4

Que. 63 **Direction: Select the one-word replacement for the following phrase:**

Tit for tat

1. revenge
2. accept
3. deny
4. approve

Solution Correct Option - 1

Que. 64 **Direction: Choose the appropriate answer for the given sentence:**

He came here _____ day before.

1. a
2. an
3. the
4. None of these

Solution Correct Option - 3

Que. 65 **Direction: Change the Voice -**

The crown was being laughed at by them.

1. They are laughing at the crown.
2. Them were laughing at the crown.
3. They were laughing at the crown.
4. They were being laughing at the crown.

Solution Correct Option - 3

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

He said to me, "I have no time for you."

1. He told me that she had no time for me.

2. He told me that he had no time for me.
3. He told me that he has no time for me.
4. He told me that he have no time for me.

Solution Correct Option - 2

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

His _____ read arts confused us.

1. definite
2. vague
3. anxious
4. indecisive

Solution Correct Option - 2

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

We don't know the reason _____ his failure.

1. to
2. for
3. at
4. by

Solution Correct Option - 2

Que. 69 **Direction:** Fill in the blank with the correct answer:

The robbers are sharing the money among _____ .

1. themselves
2. himself
3. ourselves
4. theirselves

Solution Correct Option - 1

Que. 70 **Direction:** Fill in the blank with the correct answer:

He _____ the ground before the match started.

1. had cleaned
2. has cleaned
3. is cleaning
4. none of these

Solution Correct Option - 1