Agniveer Vayu (Group X)

Memory Based Paper

Other than Science

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70 Questions

Que. 1 When the length and area of cross-section both are doubled, then its resistance

1. Will become half
2. Will be doubled
3. Will remain the same
4. Will become four times

Correct Option **- 3**

Que. 2 The surface charge density of a thin spherical shell placed in an air medium is 88.54 c/m^2 The intensity of the electric field measured 12 mm outside the shell from the centre of the shell is 5.625×10^{12} N/C. The thin spherical shell has a radius of:

1. 10.5 mm
2. 6.0 mm
3. 0.35 mm
4. 9.0 mm

Correct Option **- 4**

Que. 3 An electric dipole is formed by two equal and opposite charges q with separation d. The charges have same mass m. It is kept in a uniform electric field E. If it is slightly rotated from its equilibrium orientation, then its angular frequency ω is:

1. $\sqrt{\frac{qE}{md}}$
2. $\sqrt{\frac{2qE}{md}}$
3. $2\sqrt{\frac{qE}{md}}$
4. $\sqrt{\frac{qE}{2md}}$

Correct Option **- 2**

Que. 4 A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

($\mu_0 = 4\pi \times 10^{-7}$ TmA^{-1})

1. 6.28×10^{-5} T
2. 3.14×10^{-5} T
3. 6.28×10^{-4} T
4. 3.14×10^{-4} T

Correct Option - **3**

Que. 5 Which is not an electromagnetic wave?

1. Radio
2. Infrared
3. Sound
4. Ultraviolet

Correct Option - **3**

Que. 6 The dimensions of energy are:

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

Correct Option - **4**

Que. 7 The dimensional formula for specific gravity is given by:

1. $M^1L^0T^1$
2. $M^1L^1T^0$
3. $M^0L^0T^0$
4. $M^0L^1T^1$

Correct Option - **3**

Que. 8 An object is placed 30 cm before a concave mirror of focal length of 20 cm to get a real image. What will be the distance of the image from the mirror?

1. 60 cm
2. 30 cm
3. 20 cm
4. 40 cm

Correct Option - **1**

Que. 9 The magnetic moment of a circular coil carrying current is

1. Inversely proportional to the length of the square of the wire in the coil
2. Directly proportional to length of wire
3. inversely proportional to length of the wire
4. Directly proportional to the length of the square of the wire in the coil

Correct Option - **4**

Que. 10 The cyclic integral of (δQ - δW) for a process is

1. Positive
2. Negative
3. Zero
4. Unpredictable

Correct Option - **3**

Que. 11 If the pressure at point A is P and the atmospheric pressure is P_a, then the gauge pressure is equal to:

1. P
2. $P + P_a$
3. $P - P_a$
4. None of these

Correct Option - **3**

Que. 12 With two slits spaced 0.2 mm apart, a screen at a distance of 1m, the third bright fringe is found to be displaced 7.5 mm from the central fringe. Find the wavelength of the light used?

1. 500 mm
2. 500 nm
3. 250 nm
4. 250 mm

Correct Option - **2**

Que. 13 Kirchoff's current law is based on conservation of _____ while Kirchoff's voltage law is based on conservation of _____

1. Mass, Charge
2. Energy, Charge
3. Charge, Energy
4. Charge, Mass

Correct Option - **3**

Que. 14 n-p-n transistors are preferred over p-n-p transistors because they have

1. high mobility of holes
2. equal to mobility of holes
3. low mobility of holes
4. higher mobility of electrons than the mobility of holes in p-n-p transistors

Correct Option - **4**

Que. 15 A spring has a spring constant of 1000 N/m and its initial expansion is 10 cm. Calculate the work done in extending the spring from 10 cm to 20 cm.

1. 15 J
2. 20 J
3. 30 J
4. 40 J

Correct Option - **1**

Que. 16 The velocity of sound in air is taken as 332 m/s. If the pressure of a gas is taken double, then what will be the velocity of sound in air?

1. 996 m/s
2. 664 m/s
3. 166 m/s
4. 332 m/s

Correct Option - **4**

Que. 17 If the mass of a planet is four times the mass of the earth and the radius is half of the earth, then the gravitational acceleration of the planet is:

1. 16g
2. g/16
3. 4g
4. g

Correct Option - **1**

Que. 18 Velocity at mean position of a particle executing S.H.M. is υ, then velocity of the t particle at a distance equal to half of the amplitude;

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

Correct Option - **3**

Que. 19 Second law of thermodynamics defines:

1. Internal Energy
2. Entropy

3. Heat
4. Work

Correct Option - **2**

Que. 20 If wavelength of photon is 6000 Å, then its energy will be:

1. 0.66 eV
2. 1.66 eV
3. 2.06 eV
4. 3.5 eV

Correct Option - **3**

Que. 21 What is the moment of inertia of a ring of mass 'M' and radius 'R' about a tangent to the circle of the ring?

1. $5MR^2/2$
2. $MR^2/2$
3. $3MR^2/2$
4. $7MR^2/2$

Correct Option - **3**

Que. 22 A Carnot engine has an efficiency of 1/6. When the temperature of the sink is reduced by 62°C, its efficiency is doubled. The temperatures of the source and the sink are, respectively,

1. 62°C, 124°C
2. 99°C, 37°C
3. 124°C, 62°C
4. 37°C, 99°C

Correct Option - **2**

Que. 23 Calculate the work done by a force $\vec{F} = 2\hat{i} + 3\hat{j} + \hat{k}$ on a particle when the particle is displaced by $\vec{S} = \hat{i} + 2\hat{j} - 4\hat{k}$?

1. 4
2. 6
3. 8
4. 7

Correct Option - **1**

Que. 24 Which of the following statement is/are correct for an adiabatic process?

1. In an adiabatic process the pressure, volume and temperature of the system may change with time.
2. In an adiabatic process, there is no exchange of heat between the system and surrounding.
3. An adiabatic process is the part of thermodynamics process.
4. All of the above

Correct Option - **4**

Que. 25 The displacement of a car during its journey is given by $s = xt^2 - yt + z$ where x, y and z are constants and t is the time. The acceleration of the car at t = 4 s is

1. 4 m/s^2
2. 2x
3. √2 kmph
4. None of the above

Correct Option - **2**

Que. 26 Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 5 & 2 & 0 \\ -1 & 6 & 1 \end{bmatrix}$, then the adjoint of A is

1. $\begin{bmatrix} 2 & -5 & 32 \\ 0 & 1 & -6 \\ 0 & 0 & 2 \end{bmatrix}$
2. $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & -6 & 1 \end{bmatrix}$
3. $\begin{bmatrix} -1 & 1 & 0 \\ -5 & -2 & 0 \\ 1 & -6 & -1 \end{bmatrix}$
4. None of these

Correct Option - **4**

Que. 27 Find $\frac{d^2y}{dx^2}$ if y = sin (log x) ?

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

Correct Option - **2**

Que. 28 Evaluate: tan 75° + cot 75°

1. 0
2. ∞
3. 4
4. Undefined

Correct Option **- 3**

Que. 29 Find $\lim_{x \to 0^+} x \ln x$

1. 0
2. ∞
3. 1
4. -1

Correct Option **- 1**

Que. 30 If A is an orthogonal Matrix. Then Inverse of the Matrix $\frac{A^{-1}}{2}$ is

1. $2(A^{-1})^T$
2. $\frac{(A^T)^{-1}}{2}$
3. $\frac{(A^{-1})^T}{2}$
4. $\frac{(A^T)^{-1}}{4}$

Correct Option **- 1**

Que. 31 Solve the following:
$\frac{1}{1+\cos\theta} + \frac{1}{1-\cos\theta} = ?$

1. $2\text{cosec}^2\theta$
2. $2\sin^2\theta$
3. $2\sec^2\theta$
4. $2\tan^2\theta$

Correct Option **- 1**

Que. 32 In a class of 15 students, 5 fail in a test. Marks of remaining 10 students are 9, 6, 8, 7, 8, 9, 5, 6, 7 and 4. The median of marks of all 15 students is:

1. 5
2. 6
3. 7

4. 4

Correct Option - **2**

Que. 33 Find the angle θ between the vectors $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$?

1. $\cos^{-1}\left(\frac{4}{7}\right)$
2. $\cos^{-1}\left(\frac{5}{7}\right)$
3. $\cos^{-1}\left(\frac{5}{9}\right)$
4. None of these

Correct Option - **2**

Que. 34 What is the probability that a leap year selected at random contains 53 Sundays?

1. 1 / 7
2. 2 / 7
3. 7 / 366
4. 26 / 183

Correct Option - **2**

Que. 35 Find the number of permutations of 4 letters taken from the word EXAMINATION.

1. 1504
2. 2520
3. 2552
4. 2454

Correct Option - **4**

Que. 36 If $y = e^{5x}$ then $\frac{d^2y}{dx^2} =$

1. 25y
2. 15y
3. 10y
4. 5y

Correct Option - **1**

Que. 37 $\lim_{x \to 0} \frac{1 - \cos 2x}{x^2}$ is

1. 2
2. 0
3. 1

4. 4

Correct Option - **1**

Que. 38 Find the modulus of $z = (1 - i)^4$?

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

Correct Option - **2**

Que. 39 Differentiate cos(cos(x)) with respect to x ?

1. $\sin(\sin(x))(\sin(x))$
2. $\sin(\sin(x))(\cos(x))$
3. $\cos(\sin(x))(\sin(x))$
4. $\sin(\cos(x))(\sin(x))$

Correct Option - **4**

Que. 40 The arithmetic mean of the squares of the first n natural numbers is

1. $\frac{n(n+1)(2n+1)}{6}$
2. $\frac{n(n+1)(2n+1)}{2}$
3. $\frac{(n+1)(2n+1)}{6}$
4. $\frac{(n+1)(2n+1)}{3}$

Correct Option - **3**

Que. 41 The integral $\int_0^{\pi/2} |\sin x - \cos x|\, dx$ is equal to

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

Correct Option - **2**

Que. 42 Simplify the following: $(2 + \sqrt{y})^4 + (2 - \sqrt{y})^4$

1. $y^2 + 24y + 16$

2. $2y^2 + 48y + 32$
3. $y^2 + 48y + 32$
4. $2y^2 + 24y + 32$

Correct Option **- 2**

Que. 43 If A = {1, 2, 3, 4, 5} , B = {1, 4, 5} and R = {(a, b): a ∈ A, b ∈ B and a < b} then find the domain of R ?

1. {1, 2, 3, 4}
2. {1, 2, 3, 4, 5}
3. {1, 3, 4, 5}
4. None of these

Correct Option **- 1**

Que. 44 Find the intercepts cut off by the plane x +2y − 4z = 8.

1. (1, 2, 4)
2. (1, 2, -4)
3. (8, 4, 2)
4. (8, 4, -2)

Correct Option **- 4**

Que. 45 The number of terms in the expansion of $(x + y + z)^{10}$ is

1. 11
2. 33
3. 66
4. None of these

Correct Option **- 3**

Que. 46 The area bounded by the curve y = sin x between x = 0 and x = π is

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

Correct Option **- 3**

Que. 47 The axis of symmetry of the parabola $y^2 = x$ is:

1. Y axis

2. X axis
3. -Y axis
4. -X axis

Correct Option - **2**

Que. 48 If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then $A^5 =$

1. A
2. Identity Matrix
3. Null Matrix
4. A^{-1}

Correct Option - **4**

Que. 49 Evaluate:- $\int \sin x \sec^2 x \, dx$

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

Correct Option - **4**

Que. 50 If the median of the observations 2, 3, 5, 6, x, 8, 9, is 6 then x CANNOT be equal to:

1. 8
2. 1
3. 10
4. 7

Correct Option - **2**

Que. 51 Change the given statement to indirect speech.
Tom: "I'll be there at eight. Is that all right?"

1. Tom said that he would be there at eight and he checked if it was all right.
2. Tom said that he will be there at eight and asked if it was all right.
3. Tom told that he would be there at eight. And asked if it is all right.
4. Tom said he will there at eight and asked if that is all right.

Correct Option - **1**

Que. 52 **A sentence has been given with a blank to be filled with an appropriate option. Choose the correct alternative.**

John rushed to the spot and saw his wife and kid _____ on the road.

1. lain
2. lying
3. lie
4. laying

Correct Option **- 2**

Que. 53 Choose the part of the sentence that is incorrect in questions.
He said (1)/ that the horse (2)/ died at (3)/ the night.(4)

1. (1)
2. (2)
3. (3)
4. (4)

Correct Option **- 3**

Que. 54 **In the following questions, out of the four alternatives choose the one which can be substituted for the given words / sentence.**

'Edible' means that which is:

1. Worth eating
2. Can not be deleted
3. Can be edited
4. Edifying

Correct Option **- 1**

Que. 55 Select the word OPPOSITE in meaning to the given word.
Deficient

1. Skimpy
2. Broken
3. Ample
4. Terrible

Correct Option **- 3**

Que. 56 Find the part of the given sentence that has an error in it. If there is no error, choose 'No error'.
It is believed that difficult tasks demand lot of our resources.

1. It is believed that

2. No error
3. difficult tasks demand lot
4. of our resources.

Correct Option **- 3**

Que. 57 Some parts of a sentence have been jumbled up, and labelled P, Q, R and S. Select the option that gives the correct sequence in which these parts can be rearranged to form a meaningful and grammatically correct sentence.

The Government of India Act was passed by

P. separate acts namely, the Government of India Act 1935 and

Q. the longest act enacted by the British Parliament

R. the British Parliament in August 1935, it was

S. at that time, hence it was divided into two

the Government of Burma Act 1935,

1. QSPR
2. PQRS
3. SPQR
4. RQSP

Correct Option **- 4**

Que. 58 **A sentence has been given with a blank to be filled with an appropriate option. Choose the correct alternative.**

I _____ the cake before my mother arrived.

1. had baked
2. bake
3. baked
4. have baked

Correct Option **- 1**

Que. 59 **Choose the word opposite in meaning to the given word.**

UNSCRUPULOUS

1. Dedicated
2. Single-minded
3. Superfluous
4. Conscientious

Correct Option **- 4**

Que. 60 Here is a letter to MTNL complaining that your phone has not been working for a few days. The sentences have got jumbled up. Rearrange the sentences to make the complaint coherent.

I. My landline phone has not been working for a week.
II. I am a resident of House No. X, Street Y, Chennai.
III. Please set my phone right at the earliest.
IV. I informed the Area Manager telephonically about it but there is no response.

1. I, II, III, IV
2. II, I, IV, III
3. IV, III, II, I
4. III, II, IV, I

Correct Option **- 2**

Que. 61 Four words are given out of which only one word is correctly spelt. Find the correctly spelt word.

1. Greatfull
2. Greatful
3. Gratefull
4. Grateful

Correct Option **- 4**

Que. 62 **Direction: Select the most appropriate option to fill in the blank.**
I enjoy finding ways to make the most of my budget by being _____.

1. lethargic
2. miser
3. frugal
4. gloomy

Correct Option **- 3**

Que. 63 **Choose the option that is the active form of the sentence.**
The roads have been dug up again by the municipal authorities.

1. The municipal authorities have dug up the roads again.
2. The municipal authorities are being dug up the roads again.
3. The municipal authorities are dug up the roads again.
4. The municipal authorities were dug up the roads again.

Correct Option **- 1**

Que. 64 Which of the following is the correct noun form of the word 'Destroy' ?

1. Destructive
2. Destruction
3. Destruct

4. Destructing

Correct Option - **2**

Que. 65 **Select the option that expresses the given sentence in passive voice.**
His parents will send him to a boarding school next year

1. He will be sent to a boarding school next year by his parents.
2. He will be sent to a boarding school by his parents next year.
3. He is to be sent to a boarding school next year by his parents.
4. He would be sent to a boarding school next year by his parents.

Correct Option - **1**

Que. 66 Select the most appropriate synonym of the given word.
Grandeur

1. Magnificence
2. Liable
3. Commotion
4. Power

Correct Option - **1**

Que. 67 **Read the passage given below and answer the questions that follow.**
Almond trees are deciduous with a hardy dormancy. Typically growing 3–4.5 metres (10–15 feet) tall, the trees are strikingly beautiful when in flower; they produce fragrant, five-petaled, light pink to white flowers from late January to early April north of the Equator. The flowers are self-incompatible and thus require insect pollinators to facilitate cross-pollination with other cultivars. The growing fruit (a drupe) resembles a peach until it approaches maturity; as it ripens, the leathery outer covering, or hull, splits open, curls outward, and discharges the pit. Despite their common label, almonds are not true nuts (a type of dry fruit) but rather seeds enclosed in a hard fruit covering.
The sweet almond is cultivated extensively in certain favourable regions, though nut crops are uncertain wherever frosts are likely to occur during flowering. While more than 25 types of almonds are grown in California, Marcona and Valencia almonds come from Spain, and Ferragnes are imported from Greece.

In which months, does the Almond tree produce flower?

1. Late January to early April
2. Late April to early January
3. January
4. March to May

Correct Option - **1**

Que. 68 Which of the following options is correct?

1. The flowers of Almond have five petals.

2. The flowers are self-incompatible
3. The flowers require insect pollinators to facilitate cross-pollination
4. All of the above

Correct Option **- 4**

Que. 69 What can be deduced from the given passage?

1. Almond trees absorbs a lot amount of water
2. Almonds are not true nuts
3. Almonds are exported from India to America
4. None of the above

Correct Option **- 2**

Que. 70 What does the word 'extensively' mean in the given passage?

1. in a way that covers or affects a large area.
2. in a way that covers or affects a tiny area.
3. found in a particular region
4. covering a sandy area

Correct Option **- 1**