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# **Agniveer Vayu Group X**

**Memory Based Paper  
14 Oct 2023 Shift 1**



## 34 Questions

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**Que. 1** The angle of incidence at which reflected light is polarized for reflection from air to glass (refraction index  $\mu$ ) is

1.  $\sin^{-1}(\mu)$
2.  $\sin^{-1}(1/\mu)$
3.  $\tan^{-1}(\mu)$
4.  $\tan^{-1}(1/\mu)$

Correct Option - 3

**Que. 2** Potential inside a hollow sphere is:

1. constant
2. proportional to distance from centre
3. inversely proportional to the distance
4. inversely proportional to square of distance

Correct Option - 1

**Que. 3** Moment of inertia depends on:

1. Mass
2. Distribution of mass
3. Angular velocity
4. Position of rotational axis and mass distribution

Correct Option - 4

**Que. 4** In a common emitter transistor the current gain  $\beta$  equals to \_\_\_\_\_, where  $I_b$ ,  $I_c$ ,  $I_e$  have their usual meanings.

1.  $I_b/I_c$
2.  $I_e/I_c$
3.  $I_c/I_b$
4.  $I_c/I_e$

Correct Option - 3

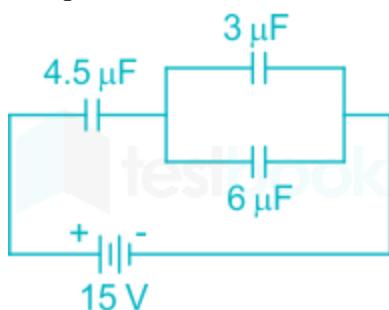
**Que. 5** SI unit of permittivity is \_\_\_\_\_

1.  $C^2 m^2 N^{-1}$
2.  $C^{-1} m^2 N^{-2}$

3.  $C^2 m^2 N^2$
4.  $C^2 m^{-2} N^{-1}$

Correct Option - 4

**Que. 6** The potential difference across the  $4.5 \mu F$  capacitor in the given circuit is



1. 10 V
2. 8 V
3. 15 V
4. 7 V

Correct Option - 1

**Que. 7** Consider an infinitely long straight conductor carrying current  $I$ . The magnetic field  $B$  due to this current-carrying conductor at a distance  $d$  from it is

1.  $\frac{\mu_0 I}{\pi d}$
2.  $\frac{\mu_0 I}{d}$
3.  $\frac{\mu_0 I}{2\pi d}$
4.  $\frac{2\pi\mu_0 I}{d}$

Correct Option - 3

**Que. 8** The mechanical equivalent of heat

1. has same dimension as work
2. has same dimension as heat
3. has same dimension as rate of doing work
4. dimensionless

Correct Option - 4

**Que. 9** A parallel plate capacitor has a capacitance of  $10 \mu F$ . If the distance between two plates is doubled then the new capacitance will be-

1.  $20 \mu F$

2.  $15 \mu\text{F}$
3.  $10 \mu\text{F}$
4.  $5 \mu\text{F}$

Correct Option - 4

**Que. 10** If the length of the semi-major axis of the elliptical orbit of a planet is doubled, the relation between the new time period of revolution of the planet around the Sun with the original time period will be-

1.  $T_2^2 = T_1^2$
2.  $T_2^2 = 2 \times T_1^2$
3.  $T_2^2 = 4 \times T_1^2$
4.  $T_2^2 = 8 \times T_1^2$

Correct Option - 4

**Que. 11** The velocity of a wave is 700 m/s and the frequency is 28Hz. Find the wavelength of the wave.

1. 25 cm
2. 25 m
3. 50 cm
4. 50 m

Correct Option - 2

**Que. 12** The efficiency of the Carnot engine is

1.  $1 - \frac{T_1}{T_2}$
2.  $1 - \frac{T_2}{T_1}$
3.  $1 + \frac{T_2}{T_1}$
4.  $1 + \frac{T_1}{T_2}$

Correct Option - 2

**Que. 13** Find the harmonic mean of 3, 6 and 10.

1. 6.33
2. 5
3. 5.6
4. 4.5

Correct Option - 2

**Que. 14** If  $3 \tan^{-1}x + \cot^{-1}x = \pi$ , then x equals

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

Correct Option - 2

**Que. 15** Find the equation of directrix of the parabola  $y^2 + 8y - 12x + 4 = 0$  ?

1.  $x - 4 = 0$
2.  $x + 4 = 0$
3.  $x + 2 = 0$
4.  $x - 2 = 0$

Correct Option - 2

**Que. 16** Find the value of k for which the function  $f(x) = \begin{cases} kx + 5, & \text{when } x \leq 2 \\ x - 1, & \text{when } x > 2 \end{cases}$  is continuous at  $x = 2$ ?

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

Correct Option - 1

**Que. 17** Thirty two number card bearing numbers 1 to 32 are put in a box and then a number card is drawn from it at random.

What is the probability that the number card bears a prime number?

1.  $\frac{13}{32}$
2.  $\frac{3}{8}$
3.  $\frac{11}{32}$
4.  $\frac{5}{16}$

Correct Option - 3

**Que. 18**  $\int x^3 e^{x^2} dx =$

1.  $\frac{1}{2}(x^2 + 1)e^{x^2} + c$
2.  $(x^2 + 1)e^{x^2} + c$
3.  $\frac{1}{2}(x^2 - 1)e^{x^2} + c$

4.  $(x^2 - 1)e^{x^2} + c$

Correct Option - 3

**Que. 19**

$$\int_0^{\frac{\pi}{2}} \frac{\cos x}{(1+\sin x)(2+\sin x)} dx =$$

1.  $\log \frac{4}{3}$
2.  $\log \frac{1}{3}$
3.  $\log \frac{3}{4}$
4. None of these

Correct Option - 1

**Que. 20**

If p and q are non-zero constants, the equation  $x^2 + px + q = 0$  has roots  $\alpha$  and  $\beta$ , then the equation  $qx^2 + px + 1 = 0$  has roots

1.  $\alpha$  and  $\frac{1}{\beta}$
2.  $\frac{1}{\alpha}$  and  $\beta$
3.  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$
4. None of these

Correct Option - 3

**Que. 21**

If  $y = 1 - \cos\theta$ ,  $x = 1 - \sin\theta$  then  $\frac{dy}{dx}$  at  $\theta = \frac{\pi}{4}$  is

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

Correct Option - 1

**Que. 22**

If at any instant t, for a sphere, r denotes the radius, S denotes the surface area and V denotes the volume, then what is  $\frac{dV}{dt}$  equal to?

1.  $\frac{1}{2}S \frac{dr}{dt}$
2.  $\frac{1}{2}r \frac{dS}{dt}$
3.  $r \frac{dS}{dt}$
4.  $\frac{1}{2}r^2 \frac{dS}{dt}$

Correct Option - 2

**Que. 23**

If  $a, b, c$  are non-zero real numbers, then the inverse of the matrix  $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$  is equal to

1.  $\begin{bmatrix} a^{-1} & 0 & 0 \\ 0 & b^{-1} & 0 \\ 0 & 0 & c^{-1} \end{bmatrix}$
2.  $\frac{1}{abc} \begin{bmatrix} a^{-1} & 0 & 0 \\ 0 & b^{-1} & 0 \\ 0 & 0 & c^{-1} \end{bmatrix}$
3.  $\frac{1}{abc} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
4.  $\frac{1}{abc} \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$

Correct Option - 1

**Que. 24**

The area bounded by curve  $y^2 = x$ , line  $y = 4$  and y-axis is

1.  $16/3$
2.  $64/3$
3.  $7\sqrt{2}$
4. None of these

Correct Option - 2

**Que. 25**

Select the most appropriate synonym of the given word.

Eternal

1. Perpetual
2. Repetition
3. Prolonged
4. Look

Correct Option - 1

**Que. 26**

What is the antonym of the given word?

Gentle

1. Mild
2. Tender

3. Harsh
4. Merciful

Correct Option - 3

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**Que. 27** In the following question, out of the given four alternatives, select the alternative which best expresses the meaning of the Idiom/Phrase.

In black and white

1. In writing
2. In trouble
3. In suspense
4. In brief

Correct Option - 1

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**Que. 28** Find the word which is correctly spelt from the given options.

1. Exemplary
2. Indifference
3. Heirarchy
4. Feudel

Correct Option - 1

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**Que. 29** What is the verb form of the given noun?

Expansion

1. Expandable
2. Expanding
3. Expand
4. Expansionist

Correct Option - 3

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**Que. 30** Convert the given sentence into Indirect speech.

Sunil said, "Where is Sunita?"

1. Sunil asked where Sunita had been
2. Sunil asked where Sunita is
3. Sunil asked where Sunita was.
4. Sunil said that where is Sunita.

Correct Option - 3

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Transform the following sentence from active voice to passive voice:

**Que. 31** Someone is following us

1. We are being followed by someone
2. Someone has been followed by us
3. We were followed by someone.
4. Someone are followed by us.

Correct Option - 1

**Que. 32** Fill in the blank with correct option:

It \_\_\_\_\_ if you had not caught it.

1. will break
2. was breaking
3. would have broken
4. would break

Correct Option - 3

**Que. 33** In the given sentence, identify the segment which contains the grammatical error

Many a man have realized that real happiness lies in making sacrifices.

1. Many a man
2. have realized that
3. real happiness lies
4. in making sacrifices.

Correct Option - 2

**Que. 34** Improve the underlined part. If no improvement is required, mark your answer as 'No improvement'.

When I get home, my children would be playing.

1. are playing
2. were playing
3. will have been playing
4. No improvement

Correct Option - 3