

## General Maths & Science Previous Questions

### Maths

**Question 1.** If A and B are invertible matrices of order 3,  $|A| = 2$  and  $| (AB)^{-1}| = -1/6$ . Find  $|B|$ .

**Solution:**

$$| 1/(AB)| = -1/6 \Rightarrow 1/(|A||B|) = -1/6 \Rightarrow |B| = -3.$$

**Question 2.** Differentiate  $\sin^2(x^2)$  w.r.t  $x^2$ .

**Solution:**

$$2 \sin(x^2) \cos (x^2) \text{ or } \sin (2x^2)$$

**Question 3.** Write the order of the differential equation:  $\log (d^2y/dx^2) = (dy/dx)^3 + x$ .

**Solution:**

2

**Question 4.** Find the acute angle which the line with direction cosines  $1/\sqrt{3}, 1/\sqrt{6}, n$  makes with positive direction of z-axis.

**Solution:**

$$l^2 + m^2 + n^2 = 1 \Rightarrow (1/\sqrt{3})^2 + (1/\sqrt{6})^2 + n^2 = 1 \Rightarrow \cos \gamma = 1/\sqrt{2} \Rightarrow \gamma = 45^\circ \text{ or } \pi/4.$$

**OR**

**Question 4.** Find the direction cosines of the line:  $(x - 1)/2 = -y = (z + 1)/2$ .

**Solution:**

**Direction ratios of the given line are 2, -1, 2.**

**Hence, direction cosines of the line are:**

$$2/3, -1/3, 2/3 \text{ or } -2/3, 1/3, -2/3$$

## **Section B**

**Question 5.** Let  $A = Z \times Z$  and  $*$  be a binary operation on  $A$  defined by

$$(a,b)*(c,d) = (ad + bc, bd).$$

**Find the identity element for  $*$  in the set  $A$ .**

**Solution:**

An element  $(e, f) \in \mathbb{Z} \times \mathbb{Z}$  be the identity element, if

$$(a, b) * (e, f) = (a, b) = (e, f) * (a, b) \quad \forall (a, b) \in \mathbb{Z} \times \mathbb{Z}$$

$$\text{i.e., if, } (af + be, bf) = (a, b) = (eb + fa, fb)$$

$$\text{i.e., if, } af + be = a = eb + fa \text{ and } bf = b = fb \dots(1)$$

$$\text{i.e., if, } f = 1, e = 0 \dots(2)$$

Hence,  $(0, 1)$  is the identity element.

<https://www.freshersnow.com/number-series-quiz/>

**Question 6:**

If a die is thrown and a card is selected at random from a deck of 52 playing cards, then find the probability of getting an even number on the die and a spade card.

**Solution:**

Let  $E_1$  = Event for getting an even number on the die and  $E_2$  = Event that a spade card is selected

$$\therefore P(E_1) = \frac{3}{6} = \frac{1}{2} \text{ and } P(E_2) = \frac{13}{52} = \frac{1}{4}$$

$$\text{Then, } P(E_1 \cap E_2) = P(E_1) \cdot P(E_2) = \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8}$$

**Question 7: Find the number of all possible matrices of order  $2 \times 2$  with each entry 0, 1 or 2.**

**Solution:**

**Elements of a  $2 \times 2$  matrix = 4**

**Each of these elements can be either 0, 1 or 2**

**Each of the 4 elements can be filled in three possible ways.**

**Therefore, by the multiplication principle,**

**The required number of possible matrices is  $3^4 = 81$**

**Question 8:**

**Find the differential equation of all non-vertical lines in a plane.**

**Solution:**

The family of all non-vertical line is represented as:

$$y = mx + c, \text{ where } m \neq \tan \frac{\pi}{2}$$

On differentiating above equation w. r. t.  $x$ , we get

$$\frac{dy}{dx} = m \dots\dots(i)$$

Again, differentiating equation (i) w. r. t.  $x$ , we get

$$\frac{d^2y}{dx^2} = 0$$

## General Science

1. Which vitamin is needed to prevent Xero-phthemia?

A. A

B. B

C. C

D. D

Ans: A

2. Why the white blood corpuscles are popularly called "soldiers of the body"?

**A. March at a regular pace**

**B. Appear uniform**

**C. Defend the body**

**D. Disciplined**

**Ans: C**

**3. The oxidation state of oxygen in  $\text{OF}_2$  is:**

**A. +2**

**B. -2**

**C. +1**

**D. -1**

**Ans: A**

**4. The acid is a substance which:**

**A. Accepts (gains) electron**

**B. Donates electrons**

**C. Provides (donates) proton**

**D. Donates  $\text{OH}^-$  ion**

**Ans: C**

**5. Which of the following phenomena is related with the large transformers, when used for some time, become very hot and is cooled by circulating oil?**

**A. The heating effect of current alone**

**B. Hysteresis loss alone**

**C. Both the heating effect of current and hysteresis loss**

**D. Intense sunlight at noon**

**Ans: C**

**6. Which of the following name of scientist is expressed as a unit of nuclear size?**

**A. Fermi**

**B. angstrom**

**C. newton**

**D. tesla**

**Ans: A**

**<https://www.freshersnow.com/previous-year-question-papers/>**

**7. Chromosome complement in Turner's syndrome is**

**A. 47; XXY**

**B. 45; XO**

**C. 46; XX**

**D. 47; XYY**

**Ans: B**

**8. Excess of amino acids is broken down to form urea in:**

**A. Kidney**

**B. Liver**

**C. Spleen**

**D. Rectum**

**Ans: A**