GOVERDHAN VIDYAPEETH

CLASS – XII (SCI)

SUMMER HOLIDAY HOMEWORK

2019 - 20

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ENGLISH:

- Solve the all passages of poetry.
- Learn the question answers of total chapter have done in class.
- Give the summary of the chapter- The last lesson and the mother at sixty -six.
- Give the character sketch of charly in the third level.

MATHS:

- Do all examples of chapter. 2, 3 and 4 in ncert textbook.
- Revision chapter.1 to 4 in rough copy.
- Do all questions of chapter. 2, 3 and 4 provided by internet in copy.

CHEMISTRY:

- Read and write all the derivations related to concentration and colligative properties.
- Write all the related formulas of chapter.-1 solution in rough copy.
- 10 numerical should be done per each topic.

BIOLOGY:

- Write all chapters' notes and ncert solutions.
- Revise all chapters do in class.
- Complete prepare ch.4 for test in 1 July.
- Complete prepare all test questions for next combined test.

GOVERDHAN VIDYAPEETH
CLASS-XII
MATHEMATICS

CBSE 12th Mathematics
Chapter 2 (Inverse Trigonometric Functions)
Important Questions Unsolved

SECTION - A

Question number 1 to 19 carry 1 mark each.

Q. 1: What is the principal value of:

$$sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)?$$

Q.2: Write the principle value of:

$$cos^{-1}\left(\frac{1}{2}\right) - 2\ sin^{-1}\left(-\frac{1}{2}\right).$$

Q.3: Using principal value, evaluate the following:

$$cos^{-1}\left(cos\ \frac{2\pi}{3}\right) + sin^{-1}\left(sin\ \frac{2\pi}{3}\right).$$

Q.4: Write the principal value of:

$$\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$$

Q.5: Write the principal value of $sec^{-1}(-2)$.

Q.6: What is the principle value of:

$$cos^{-1}\left(cos\frac{2\pi}{3}\right) + sin^{-1}\left(sin\frac{2\pi}{3}\right)?$$

Q.7: Find the principle value of :

$$\tan^{-1}\sqrt{3} - \sec^{-1}(-2).$$

Q.8: Write the principal value of

$$\tan^{-1}(\sqrt{3}) - \cot^{-1}(-\sqrt{3}).$$

Q.9: Write the value of

$$\tan^{-1}\left[\left(2sin^{-1}\frac{\sqrt{3}}{2}\right)\right]$$

Q.10: If

$$tan^{-1}x + tan^{-1}y = \frac{\pi}{4}, xy < 1,$$

Then write the value of $x + y + xy$.

Q. 11: Evaluate:

$$\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$$

Q.12: Using principal value, evaluate the following:

$$\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$$

Q.13: What is the principal value of:

$$sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)?$$

Q.14: Write the value of

$$\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$$

Q.15: Write the principle value of:

$$cos^{-1}\left(\frac{1}{2}\right) - 2\,sin^{-1}\left(-\frac{1}{2}\right)$$

Q.16: Write the principal value of

$$tan^{-1}(1) + cos^{-1}\left(-\frac{1}{2}\right).$$

Q. 17: Write the value of $tan\left(2tan^{-1}\frac{1}{5}\right)$

Q. 18: If $\sin\left(sin^{-1}\frac{1}{5} + cos^{-1}x\right) = 1$

then find the value of x.

Q.19: Solve for x:

$$2\,tan^{-1}(cos\,x) = tan^{-1}(2\,cosec\,x)$$

SECTION – B

Question number 20 to 53 carry 4 mark each.

Q.20: Prove the following:

$$tan^{-1}\frac{1}{3} + tan^{-1}\frac{1}{5} + tan^{-1}\frac{1}{7} + tan^{-1}\frac{1}{8} = \frac{\pi}{4}.$$

Q.21: Prove that:

$$\sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{16}{65}\right) = \frac{\pi}{2}$$

Q.22: Solve for x:

$$\tan^{-1} 3x + \tan^{-1} 2x = \frac{\pi}{4}.$$

Q.23: Prove that:

$$\tan^{-1}\left[\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right] = \frac{\pi}{4} - \frac{1}{2}\cos^{-1} x, \frac{-1}{\sqrt{2}} \leq x \leq 1.$$

Q.24: If

$$\tan^{-1}\left(\frac{x-2}{x-4}\right) + \tan^{-1}\left(\frac{x+2}{x+4}\right) = \frac{\pi}{4}, \text{find the value of } x.$$

Q.25: Solve for x:

$$tan^{-1}(x+1) + tan^{-1}(x-1) = tan^{-1}\frac{8}{31}$$

Q.26: Prove the following:

$$cot^{-1}\left(\frac{xy+1}{xy-1}\right) + cot^{-1}\left(\frac{yz+1}{y-z}\right) + cot^{-1}\left(\frac{zx+1}{z-x}\right) = 0$$

$(0 < xy, yz, zx < 1)$

Q.27: Show that:

$$\tan\left(\frac{1}{2}sin^{-1}\frac{3}{4}\right) = \frac{4-\sqrt{7}}{3}$$

Q.28: Solve the following equation:

$$\cos\left(tan^{-1}x\right) = \sin\left(cot^{-1}\frac{3}{4}\right).$$

Q.29: Prove the following:

$$\cos\left(\sin^{-1}\frac{3}{5}+\cot^{-1}\frac{3}{2}\right)=\frac{6}{5\sqrt{13}}$$

Q.30: If

$$\tan^{-1}\frac{x-3}{x-4}+\tan^{-1}\frac{x+3}{x+4}=\frac{\pi}{4},$$

Then find the value of x.

Q.31: Prove the following:

$$\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)+\tan^{-1}\left(\frac{1}{8}\right)=\frac{\pi}{4}$$

Q.32: Solve for x:

$$\tan^{-1}\left(\frac{x-1}{x-2}\right)+\tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}.$$

Q.33: Prove the following:

$$\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}, x\in\left(0,\frac{\pi}{4}\right)$$

Q.34: Solve for x:

$$2\tan^{-1}(\cos x)=\tan^{-1}(2\operatorname{cosec} x).$$

Q.35: Prove the following:

$$\tan^{-1}x+\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right).$$

Q.36: Prove the following:

$$\cos\left[\tan^{-1}\{\sin(\cot^{-1}x)\}\right]=\sqrt{\frac{1+x^2}{2+x^2}}.$$

Q.37: Prove that:

$$\tan^{-1}\left[\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right]=\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x, -\frac{1}{\sqrt{2}}\le x\le 1.$$

Q.38: Solve the equation for x

$$\sin^{-1}x+\sin^{-1}(1-x)=\cos^{-1}x$$

Q.39: If

$$\cos^{-1}\frac{x}{a}+\cos^{-1}\frac{y}{b}=\alpha,$$

Prove that

$$\frac{x^2}{a^2}-2\frac{xy}{ab}\cos\alpha+\frac{y^2}{b^2}=\sin^2\alpha.$$

Q.40: Prove that

$$\tan\left\{\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right\}+\tan\left\{\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right\}=\frac{2b}{a}$$

Q.41: Prove the following:

$$\tan^{-1}\sqrt{x}=\frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x\in(0,1)$$

Q.42: Prove the following:

$$\cos^{-1}\left(\frac{12}{13}\right)+\sin^{1}\left(\frac{3}{5}\right)=\sin^{-1}\left(\frac{56}{65}\right)$$

Q.43: Prove the following:

$$cot^{-1}\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]=\frac{x}{2}, x\in\left(0,\frac{\pi}{4}\right)$$

Q.44: Find the value of:

$$\tan^{-1}\left(\frac{x}{y}\right)-\tan^{-1}\left(\frac{x-y}{x+y}\right)$$

Q.45: Prove that:

$$tan^{-1}\left(\frac{cosx}{1+sinx}\right)=\frac{\pi}{4}-\frac{x}{2}, x\epsilon\left(-\frac{\pi}{2},\frac{\pi}{2}\right).$$

Q.46: Prove that

$$sin^{-1}\left(\frac{8}{17}\right)+sin^{-1}\left(\frac{3}{5}\right)=cos^{-1}\left(\frac{36}{85}\right).$$

Q.47: Find the value of the following:

$$\tan\frac{1}{2}\left[sin^{-1}\frac{2x}{1+x^2}+cos^{-1}\frac{1-y^2}{1+y^2}\right],$$

$$|x|<1, y>0 \text{ and } xy<1.$$

Q.48: Prove that:

$$tan^{-1}\left(\frac{1}{2}\right)+tan^{-1}\left(\frac{1}{5}\right)+tan^{-1}\left(\frac{1}{8}\right)=\frac{\pi}{4}.$$

Q. 49: Prove that

$$cot^{-1}\left(\frac{\sqrt{1+sin\,x}+\sqrt{1-sin\,x}}{\sqrt{1+sin\,x}-\sqrt{1-sin\,x}}\right)=\frac{x}{2}; x\,\epsilon\left(0,\frac{\pi}{4}\right).$$

Q.50: Prove that

$$2\,tan^{-1}\left(\frac{1}{5}\right)+sec^{-1}\left(\frac{5\sqrt{2}}{7}\right)+2\,tan^{-1}\left(\frac{1}{8}\right)=\frac{\pi}{4}.$$

Q.51: If $\sin[\cot^{-1}(x+1)]=\cos(\tan^{-1}x)$, **thenfind** x.

Q.52: If

$(tan^{-1}x)^2+(cot^{-1}x)^2=\frac{5\pi^2}{8}$, **then find** x.

Q.53: Prove that:

$$tan^{-1}\frac{1}{5}+tan^{-1}\frac{1}{7}+\ tan^{-1}\frac{1}{3}+tan^{-1}\frac{1}{8}=\frac{\pi}{4}$$

GOVERDHAN VIDYAPEETH

CBSE 12th Mathematics

Chapter 3 (Matrices)

Important Questions Unsolved

CBSE 12th Mathematics
Chapter 3 (Matrices)
Important Questions Unsolved

SECTION - A

Question number 1 to 31 carry 1 mark each.

Q.1: **Show that all the diagonal elements of a skew symmetric matrix are zero.**

Q.2: **Find the value of x and y if:**

$$2\begin{bmatrix}1 & 3\\ 0 & x\end{bmatrix}+\begin{bmatrix}y & 0\\ 1 & 2\end{bmatrix}=\begin{bmatrix}5 & 6\\ 1 & 8\end{bmatrix}$$

Q.3: **If matrix A = [1 2 3], write AA', where A' is the transpose of matrix A.**

Q.4: **If $A=\begin{pmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{pmatrix}$, then for what value of α is A an identity matrix**

Q. 5: **If $\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}\begin{pmatrix}3 & 1\\ 2 & 5\end{pmatrix}=\begin{pmatrix}7 & 11\\ k & 23\end{pmatrix}$, then write the value of k**

Q.6: **For a 2×2 matrix, $A=[a_{ij}]$, whose elements are given by $a_{ij}=i/j$, write the value of a_{12}.**

Q.7: **For what value of x, the matrix $\begin{bmatrix}5-x & x+1\\ 2 & 4\end{bmatrix}$ is singular?**

Q.8: **If $\begin{pmatrix}2 & 3\\ 5 & 7\end{pmatrix}\begin{pmatrix}1 & -3\\ -2 & 4\end{pmatrix}=\begin{pmatrix}-4 & 6\\ -9 & x\end{pmatrix}$, write the value of x.**

Q.9: **Simplify: $\cos\theta\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}+\sin\theta\begin{bmatrix}\sin\theta & -\cos\theta\\ \cos\theta & \sin\theta\end{bmatrix}$**

Q.10: **Find the value of a if**

$$\begin{bmatrix}a-b & 2a+c\\ 2a-b & 3c+d\end{bmatrix}=\begin{bmatrix}-1 & 5\\ 0 & 13\end{bmatrix}$$

Q.11: **If $\begin{bmatrix}9 & -1 & 4\\ -2 & 1 & 3\end{bmatrix}=A+\begin{bmatrix}1 & 2 & -1\\ 0 & 4 & 9\end{bmatrix}$, then find the matrix A.**

Q.12: If $2\begin{bmatrix}3 & 4\\ 5 & x\end{bmatrix}+\begin{bmatrix}1 & y\\ 0 & 1\end{bmatrix}=\begin{bmatrix}7 & 0\\ 10 & 5\end{bmatrix}$, $find\ (x-y)$.

Q.13: Solve the following matrix equation

for x:, $\begin{bmatrix}x & 1\end{bmatrix}.\begin{bmatrix}1 & 0\\ -2 & 0\end{bmatrix}=0$.

Q.14: If A is a square matrix such that $A^2 = I$, then find the simplified value of $(A-I)^3+(A-I)^3-7A$.

Q.15: Matrix $A=\begin{bmatrix}0 & 2b & -2\\ 3 & 1 & 3\\ 3a & 3 & -1\end{bmatrix}$ is given to be symmetric, find values of a and b.

Q.16: If the matrix $A=\begin{bmatrix}0 & a & -3\\ 2 & 0 & -1\\ b & 1 & 0\end{bmatrix}$ Is skew symmetric, find the value of 'a' and 'b'.

Q.17: Given $A=\begin{bmatrix}2 & -3\\ -4 & 7\end{bmatrix}$, compute A^{-1} and show that $2A^{-1}=9I-A$

Q.18: If A is a skew-symmetric matrix of order 3, then prove that det $A = 0$.

Q.19: If $\begin{pmatrix}2 & 3\\ 5 & 7\end{pmatrix}\begin{pmatrix}1 & -3\\ -2 & 4\end{pmatrix}=\begin{pmatrix}-4 & 6\\ -9 & x\end{pmatrix}$, write the value of x.

Q.20: For what value of *x*, is the following matrix singular?

$\begin{bmatrix}3-2x & x+1\\ 2 & 4\end{bmatrix}$

Q.21: Find the value of x, if:

$\begin{pmatrix}3x+y & -y\\ 2y-x & 3\end{pmatrix}=\begin{pmatrix}1 & 2\\ -5 & 3\end{pmatrix}$.

Q.22: Write the adjoint of the following matrix:

$\begin{pmatrix}2 & -1\\ 4 & 3\end{pmatrix}$

Q.23: If a matrix has 5 elements, write all possible orders it can have.

Q.24: Find the value of x + y from the following equation:

$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$$

Q.25: If $A^T \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ **and** $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$. **then find** $A^T - B^T$.

Q.26: For what value of x, is the matrix

$$A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$$ **a skew − symmetric matrix ?**

Q.27: If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ **and** $A^2 = KA$, **I then write the value of** k.

Q.28: If A is a square matrix such that $A^2 = A$, **then write the value of** $7A - (I + A)^3$, **where I is an identity matrix.**

Q.29: If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, **find the value of** $x + y$.

Q.30: Use elementary column operation $C_2 \to C_2 + 2C_1$ **in the following matrix equation:**

$$\begin{pmatrix} 2 & 1 \\ 2 & 0 \end{pmatrix} = \begin{pmatrix} 3 & 1 \\ 2 & 0 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix}$$

Q.31: Write the number of all possible matrices of order 2×2 **with each entry** $1, 2$ **or 3.**

SECTION - B

Question number 32 to 39 carry 4 mark each.

Q.32: Let $A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix}, B = \begin{pmatrix} 5 & 2 \\ 7 & 4 \end{pmatrix}, C = \begin{pmatrix} 2 & 5 \\ 3 & 8 \end{pmatrix}$,

Find a matrix D such that $CD - AB = 0$

Q.33: $Let\ A = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$. **Express A as sum of two matrices such that one is symmetric and other is skew symmetric.**

Q.34: IF $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, $verify\ that$

$A^2 - 4A - 5I = 0$.

Q.35: **Using elementary row operations, find the inverse of the following matrix:**

$\begin{pmatrix} 2 & 5 \\ 1 & 3 \end{pmatrix}$

Q.36: If $A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$ find $A^2 - 5A + 4I$

and hence find a matrix x such that $A^2 - 5A + 4I + X = 0$.

Q.37: $If\ A = \begin{bmatrix} 1 & 1 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}, find\ (A')^{-1}$.

Q.38: **Find matrix A such that**

$$\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{bmatrix}$$

Q.39: **Express the following matrix as the sum of a symmetric and a skew symmetric matrix, and verify your result:**

$\begin{pmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{pmatrix}$

SECTION - C

Question number 40 to 46 carry 6 mark each.

Q.40: Using elementary transformations, find the inverse of the matrix.

$$\begin{pmatrix} 1 & 3 & -2 \\ -3 & 0 & -1 \\ 2 & 1 & 0 \end{pmatrix}$$

Q.41: Using elementary operations, find the inverse of the following matrix:

$$\begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

Q.42: Using elementary transformations, find the inverse of the matrix

$A = \begin{pmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ **and use it to solve the following system of linear equation:**

$8x + 4y + 3z = 19$
$2x + y + z = 5$
$x + 2y + 2x = 7$

Q.43: Using elementary row transformations, find the inverse of the matrix

$$\mathrm{A} = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$$

Q.44: Using elementary transformations, find the inverse of the following matrix:

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

Q.45: Obtain the inverse of the following matrix using elementary operations;

$$A = \begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix}$$

Q.46: Find the inverse of the following matrix using elementary operations:

$$A = \begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$$


All
the Best

GOVERDHAN VIDYAPEETH

CBSE 12th Mathematics

Chapter 4 (Determinants)

Important Questions Unsolved

CBSE 12th Mathematics
Chapter 4 (Determinants)
Important Questions Unsolved

SECTION - A

Question number 1 to 23 carry 1 mark each.

Q.1. **If A_{ij} is the cofactor of the a_{ij} of the determinant.**

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$ **the value of $a_{32}.A_{32}$.**

Q.2. **If A is a 3×3 invertible matrix, then what will be the value of k if $\det(A^{-1}) = (\det A)^k$.**

Q.3. **If A_{ij} is the cofactor of the a_{ij} of the determinant.**

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$ **the value of $a_{32}.A_{32}$.**

Q. 4. **Evaluate:** $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$

Q. 5. **Find the co-factor of a_{12} in the following:**

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$

Q.6. **Write the value of:**

$$\Delta = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$$

Q.7. **If $x \in N$ and $\begin{vmatrix} x+3 & -2 \\ -3x & 2x \end{vmatrix} = 8$, then find the value of x.**

Q.8. **Write the value of the determinant:**

$$\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$$

Q.9. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|adj.A|$.

Q. 10. What is the value of the determinant:

$$\begin{vmatrix} 0 & 2 & 0 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{vmatrix} ?$$

Q.11. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, write the minor of the element a_{23}.

Q. 12. If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$, then write the value of x.

Q. 13. Write the element a_{23} of a 3×3 matrix $A = (a_{ij})$ whose elements a_{ij} are given by: $a_{ij} = \frac{|i-j|}{2}$.

Q.14. Find the maximum value of

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$$

Q15: If for any 2×2 square matrix A, $A(\text{adj } A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then write the value of $|A|$.

Q.16. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|adj.A|$.

Q.17. Write the value of the following determinant:

$$\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}.$$

Q.18. Find the value of x from the following:

$$\begin{vmatrix} x & 4 \\ 2 & 2x \end{vmatrix} = 0.$$

Q.19. A is a square matrix of order 3 and $|A| = 7$. Write the value of $|adj\ A|$.

Q.20. Evaluate: $\begin{vmatrix} cos\ 15^o & sin\ 15^o \\ sin\ 75^o & cos\ 75^o \end{vmatrix}$.

Q21. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, **write** A^{-1} **in terms of A.**

Q.22. Let A be a square matrix of order 3 x 3. Write the value of $|2A|$, **where** $|A|$**=4.**

Q.23. If $\begin{vmatrix} 3x & 7 \\ -2 & 4 \end{vmatrix} = \begin{vmatrix} 8 & 7 \\ 6 & 4 \end{vmatrix}$, **find the value of** x.

SECTION - B

Question number 1 to 6 carry 4 mark each.

Q.24. A trust invested some money in two type of bonds. The first bond pays 10% interest and second bond pays 12% interest. The trust received Rs 2,800 as interest. However, if trust had interchanged money in bonds, they would have got Rs 100 as interest. Using matrix method find the amount invested by the trust. Interest received on this amount will be given to Helpage India as donation. Which value is reflected in this questions?

Q.25. Using properties of determinants, prove the following:

$$\begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 & c^2 \end{vmatrix} = 4a^2b^2c^2$$

Q.26. Find the adjoint of the matrix

$$\mathbf{A} = \begin{pmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$$

$\mathbf{A}.(\mathbf{adj}\ \mathbf{A}) = |\mathbf{A}|\mathbf{I}_3$.

Q.27. Using properties of determinants, prove that:

$$\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

Q.28. Using properties of determinants, prove the following:

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y).$$

Q.29. Using properties of determinates, show that:

$$\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4\,abc$$

Q.30. Using properties of determinants, prove the following:

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1.$$

Q.31. Using properties of determinants, prove the following:

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1-x^3)^2.$$

Q32: Using properties of determinants, prove that

$$\begin{vmatrix} a^2+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 3 & 1 \end{vmatrix} = (a-1)^3$$

Q. 33. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$, **using properties of determinants, find the value of** $f(2x) - f(x)$.

Q.34: Using properties of determinants, prove that

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y)$$

Q.35. By using properties of determinants, prove the following:

$$\begin{vmatrix} 1 & 1+p & 1+p+q \\ 2 & 3+2p & 1+3p+2q \\ 3 & 6+3p & 1+6p+3q \end{vmatrix} = 1.$$

Q.36. Using properties of determinants, prove that:

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ca & cb & -c^2 \end{vmatrix} = 4\,a^2b^2c^2.$$

Q. 37. Using properties of determinants, prove that:

$$\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2\begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$$

Q. 38. Using properties of determinants, prove the following:

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1-x^3)^2.$$

Q. 39. Using properties of determinants, prove that

$$\begin{vmatrix} 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \\ x-y-z & 2x & 2x \end{vmatrix} = (x+y+z)^3$$

Q.40. Using properties of determinants, solve the following for x:

$$\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0.$$

SECTION - D

Question number 1 to 6 carry 6 mark each.

Q. 41. Using matrices, solve the following system of equations:

$$x + y + z = 6$$
$$x + 2z = 7$$
$$3x + y + z = 12.$$

Q.42: If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, **Find** A^{-1}. **Use it to solve the system of equations.**

$$2x - 3y + 5z = 11$$

$$3x + 2y - 4z = -5$$

$$x + y - 2z = -3.$$

Q43. Use product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ **to solve the system of equations**

$$x + 3z = 9, -x + 2y - 2z = 4, \quad 2x - 3y + 4z = -3.$$

Q.44. using properties or determinants, show that ΔABC is isosceles if:

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 + \cos A & 1 + \cos B & 1 + \cos C \\ \cos^2 A + \cos A & \cos^2 B + \cos B & \cos^2 C + \cos C \end{vmatrix} = 0$$

Q.45. A shopkeeper has 3 varieties of pens 'A', 'B' and 'C'. Meenu purchased 1 pen of each variety for a total of Rs 21. Jeevan purchased 4 pens of 'A' variety, 3 pens of 'B' variety and 2 pens of 'C' variety for Rs 60. While Shikha purchased 6 pens of 'A' variety, 2 pens of 'B' variety and 3 pens of 'C' variety for Rs 70. Using matrix method, find cost of each variety of pen.

Q.46. Using properties of determinants, prove the following:

$$\begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta + \gamma & \gamma + \alpha & \alpha + \beta \end{vmatrix} = (\alpha - \beta)(\gamma - \alpha)(\alpha - \beta - \gamma).$$

Q.47. Using matrices, solve the following system of equation:

$$2x - 3y + 5z = 11$$
$$3x + 2y - 4z = -5$$
$$x + y - 2z = -3$$

Q.48. Using properties of determinants, show the following:

$$\begin{vmatrix} (b+c)^2 & ab & ca \\ ab & (a+c)^2 & bc \\ ac & bc & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3.$$

Q.49. Using matrix method, solve the following system of equations:

$$\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4, \qquad \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1,$$

$$\frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2; x, y, z, \neq 0$$

Q.50. Using matrices, solve the following system of linear equations:

$$x-y+2z=7$$
$$3x+4y-5z=-5$$
$$2x-y+3z=12.$$

Q.51. A school wants award its students for the value of honesty, regularity and hard work a total cash award of Rs 6,000. Three times the award money for hard work added to that given for honesty amounts to Rs 11,000. The award money given for Honesty and hard work together is double the one given for regularity Represent the above situation algebraically and find the award money for each value, using matrix method apart from these values namely, Honesty, Regularity and hard work, suggest one more value which the school must include for award.

Q.52. Two schools P and Q want to award their selected students on the values of discipline, politeness and punctuality. The school P wants to award Rs x each, Rs y each and Rs z each for the three respective values to its 3, 2 and 1 students with total award money of Rs 1,000. School Q wants to spend Rs 1,500 to award its 4, 1 and 3 students on the respective values (by giving the same award money for the three values as before). If the total amount of awards for one prize on each value is Rs 600, using matrices, find the award money for each value.

Apart from the above three values, suggest one more value for awards.

Q.53. The monthly incomes of Aryan and Babban are in the ratio 3:4 and their monthly expenditures are in the ratio 5:7 if each saves Rs.15,000 per month, find their monthly incomes using matrix method. This problem reflects which value?

Q.54. Prove that:

$$\begin{vmatrix} yz-x^2 & zx-y^2 & xy-z^2 \\ zx-y^2 & xy-z^2 & yz-x^2 \\ xy-z^2 & yz-x^2 & zx-y^2 \end{vmatrix}$$

is divisible by $(x+y+z)$, and hence find the quotient.

Q. 55: Determine the product $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ **and use it to solve the system of equations** $x - y + z = 4,\ x - 2y - 2z = 9,\ 2x + y + 3z = 1$.

Q.56. Using properties of determinants, show the following:

$$\begin{vmatrix} (b+c)^2 & ab & ca \\ ab & (a+c)^2 & bc \\ ac & bc & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3.$$

Q. 57. Using properties of determinants, prove the following:

$$\begin{vmatrix} x & x^2 & 1+Px^3 \\ y & y^2 & 1+Py^3 \\ z & z^2 & 1+Pz^3 \end{vmatrix} = (1+Pxyz)(x-y)(y-z)(z-x).$$

Q.58. Using matrices, solve the following system of equations:

$$4x + 3y + 2z = 60$$
$$x + 2y + 3z = 45$$
$$6x + 2y + 3z = 70$$

Q.59. Using matrices, solve the following system of equation:

$2x + 3y + 3z = 5$,

$x - 2y + z = -4$,

$3x - y - 2z = 3$

Q. 60. The management committee of a residential colony decided to award some of its members (say x) for honesty, some (say y) for helping other (say z) for supervising the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others, using matrix method, find the number of awardees of each category. Apart from these values, namely, honesty, cooperation and supervision, suggest one more value which the management of the colony must include for awards.

Q. 61. **Two schools A and B want to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3,2 and 1 students respectively with a total award money of Rs 1,600. School B wants to spend rs 2,300 to award its 4,1 and 3 student on the respective values (by giving the same award money to the three values as before). If the total amount of award for one prize on each value is rs 900, using matrices, find the award money for each value. Apart from these three values, suggest one more value which should be considered for award.**

Q.62. **Using properties or determinants, show that ΔABCis isosceles if:**

$$\begin{vmatrix} 1 & 1 & 1 \\ 1+\cos A & 1+\cos B & 1+\cos C \\ \cos^2 A+\cos A & \cos^2 B+\cos B & \cos^2 C+\cos C \end{vmatrix} = 0$$

Q.63. **A shopkeeper has 3 varieties of pens 'A', 'B' and 'C'. Meenu purchased 1 pen of each variety for a total of Rs 21. Jeevan purchased 4 pens of 'A' variety, 3 pens of 'B' variety and 2 pens of 'C' variety for Rs 60. While Shikha purchased 6 pens of 'A' variety, 2 pens of 'B' variety and 3 pens of 'C' variety for Rs 70. Using matrix method, find cost of each variety of pen.**

GOVERDHAN VIDYAPEETH
CLASS-XII
Chap 9:Ray Optics & Optical Instruments

Important Questions for Board Exams

Board Weightage 14 Marks Optics (Chap 9+10)

1. A point object O is kept in a medium of refractive index n1 in front of a convex spherical surface of radius of curvature R which separates the second medium of refractive index n2 from the first one. Draw a ray diagram showing the image formation & deduce the relationship between the object distance & the image distance in terms of n1, n2, & R. [Derivation of Mirror formula convex & Concave both]

2. A thin convex lens having two surfaces of radii of curvature R1 & R2 is made of a material of refractive index n2. It is kept in a medium of refractive index n2. Derive the Len's maker's formula when a object is placed on principal axis in front of the radius of curvature R1 produces an image I on the other side of the lens.

3. Draw a ray diagram showing image formation in a compound microscope. Define the term 'limit of resolution' and name the factors on which it depends. How it is related to resolving power of microscope? And also suggest at least two ways by which the resolving power of microscope can be increased.

4. A ray of monochromatic light is incident on one of the faces of an equilateral triangular prism of refracting angle A. trace the path of ray passing through the prism. Hence derive an expression for the refractive index of the material of the prism in terms of the angle of minimum deviation & its refracting angle.

5. Define power of a Lens. Write its units. Deduce the relation $\frac{1}{f_1}+\frac{1}{f_2}=\frac{1}{f}$ for two thin lenses kept in contact coaxially.

6. Define Total internal refraction (TIR). Derive a relation between critical angle and the refractive index of the medium. Also explain the working of optical fiber.

7. Draw a ray diagram to show the image formation in refracting type astronomical telescope in the normal adjustment (when image is formed at infinity). Derive an expression for its magnifying power.
How does the magnifying power get affected on increasing the aperture of the objective lens and why?

8. **Draw a diagram of well labelled reflecting type telescope. Write two advantages why reflecting type telescopes are preferred over refracting type telescopes.**

9. **Answer the following questions**
   - i. **Why does the Sun appear reddish at sunset or sunrise?**
   - ii. **For which colour the refractive index of prism material is maximum and minimum.**
   - iii. **Explain the basic difference between the construction and working of a telescope and a microscope.**
   - iv. **Why the bluish colour predominates in clear Sky.**
   - v. **Write the necessary conditions for the phenomenon of total internal reflection to occur.**
   - vi. **Does critical angle depend on the colour of light? Explain.**
   - vii. **Why is there no dispersion of light refracted through a rectangular glass slab?**
   - viii. **Can absolute value of refractive index of a medium be less than unity?**

Numericals

1. **NCERT Example 9.8 (Page 328)**
2. **NCERT Example 9.9 (Page 330)**
3. **NCERT Example 9.10 (Page 337)**
4. **A ray of light passes through an equilateral prism (refractive index 1.5) such that angle of incidence is equal to angle of emergence and the latter is equal to 3/4 th of angle of prism. Calculate the angle of incidence. Ans 30^0**
5. **How much water should be filled in a container 21 cm in height, sop that is appears half-filled when viewed from the top of the container. (refractive index of water with respect to air = 4/3). Ans 12 cm**

GOVERDHAN VIDYAPEETH
CLASS - XII
Chap 10 : Wave Optics

Important Questions for Board Exams

Board Weightage 14 Marks Optics (Chap 9+10)

1. **Define Wavefront. State Huygens' principle & also verify Snell's law**

2. **Prove the law of reflection & refraction on the basis of wave theory.**

3. **Define the term 'Coherent sources' & what do you mean by Interference of Light explain?**

4. **State the importance of coherent sources in the interference. In Young's double slit experiment to produce interference pattern, obtain the conditions for constructive & destructive interference. Hence, deduce the expression for the fringe width. How does the fringe width get affected, if the entire experimental apparatus of YDSE is immersed in water?**

5. **Consider two coherent sources S1 & S2 producing monochromatic waves to produce interference pattern. Let the displacement of the wave produced by the S1 be given by $y_1 = a\,cos\,\omega t$ and the displacement by S2 be $y_2 = a\,cos\,(\omega t + \phi)$. Find out the expression for the amplitude of the resultant displacement at a point and show that the intensity at that point will be $I = 4a^2 Cos^2\frac{\phi}{2}$. Hence establish the conditions for constructive & destructive interference.**

6. **What is the effect on the interference fringes to a Young's double slit experiment when**
   (i) The separation between the two slits is decreased/
   (ii) The width of the source slit is increased/
   (iii) The monochromatic source is replaced by a source of white light ?
   Justify your answer in each case.

7. **What do you mean by diffraction of light and state the condition for the diffraction?**
   Obtain the conditions for secondary maxima and minima. Also draw the intensity distribution curve versus path difference.

8. **Prove that the width of central maxima is twice the width of the secondary maxima. How does the width of central maxima depend on the width of the slit?**

9. **Write three characteristic features to distinguish between the interference fringe in Young's double slit experiment and the diffraction pattern obtained due to a narrow single slit.**

10. **Explain the following**
    - **(i) Malu's law**
    - **(ii) Brewster's Angle**
    - **(iii) Brewster's Law**
    - **(iv) Fresnel's distance**

11. **How does an unpolarised light incident on a polaroid gets polarized? Describe briefly with the help of a necessary diagram, the polarization of light by reflection from a transparent medium.**

12. **Two Polaroids A and B kept in crossed position. How should a third polaroid, C be placed in between so that the intensity of polarised light transmitted by polaroid, B reduced to 1/8 th of the intensity of unpolarised light incident on A?**

Numericals

1. **NCERT Example 10.3 (Page 366)**
2. **NCERT Example 10.4 (Page 366)**
3. **NCERT Example 10.5 (Page 370)**
4. **NCERT Example 10.6 (Page 373)**
5. **NCERT Example 10.7 (Page 376)**
6. **NCERT Example 10.8 (Page 378)**
7. **NCERT Example 10.9 (Page 381)**

GOVERDHAN VIDYAPEETH
CLASS-XII
Chap 11 : Dual Nature of Radiation & Matter

Important Questions for Board Exams

Board Weightage 4 Marks (Chap 11)

1. **What is photon & photo electric effect? Explain the laws of photoelectric emission.**

2. **Define the term (i) 'cut-off voltage' and (ii) 'threshold frequency (iii) 'work function' of a metal (iv) Stopping potential, in relation to the photoelectric effect.**

   Using Einstein's photoelectric equation show how the cut-off voltage & threshold frequency for a given photosensitive material can be determined with the help of a suitable graph.

3. **Write Einstein's photoelectric equation & point out ant two characteristic properties of photons on which this equation is based.**
   Briefly explain the three observed features which can be explained by this equation.

4. **Why photoelectric effect cannot be explained on the basis of wave nature of light? Give reasons.**

5. **State and explain de Broglie relation for matter waves.**

6. **Describe briefly how the Davision-Germer experiment demonstrated the wave nature of electrons.**

7. **An electron is accelerated from rest through a potential V. obtain the expression for the de Broglie wavelength associated with it.**

8. **An electron and a proton, each have de Broglie wavelength of 1.00 nm. (i) Find the ratio of their momenta. (ii) compare the kinetic energy of the proton with that of the electron.** **Ans (i) 1:1 (ii) 5.4×10^{-4}**

GOVERDHAN VIDYAPEETH
CLASS - XII
Chap 12 : Atoms

Important Questions for Board Exams

Board Weightage 6 Marks (Chap 12+13)

1. **Write basic assumption of Rutherford's atomic model & also exapli the drawbacks of Rutherford's model.**

2. **Explain Bohr's theory of hydrogen atom in the form of three postulates & also point out the limitations of Bohr's model.**

3. **What do you mean by distance of closest approach & also write the formula with proper symbols explanations.**

4. **In the Study of Geiger-Marsden experiment on scattering of alpha particles by a thin foil of gold, draw the trajectory of alpha particles in the coulomb field of target nucleus. Explain briefly how one gets the information on the size of the nucleus from this study.**

   From the relation $R = R_0 A^{1/3}$, where R_0 is constant & A is the mass number of the nucleus, show that nuclear matter density is independent of A.

5. **Using the postulates of Bohr's model of hydrogen atom, obtain an expression for the frequency of radiation emitted when the atom makes a transition from the higher energy state with quantum number n_i to the lower energy state with quantum number n_f. Where n_f is smaller than n_i.**

6. **Using Bohr's postulates, obtain the expression for the total energy of the electron in the stationary states of the hydrogen atom. Hence draw the energy level diagram showing how the line spectra corresponding to Balmer series occur due to transition between energy levels.**

7. **The value of ground state energy of hydrogen atom is -13.6 eV.**
   - **(i) Find the energy required to move an electron from the ground state to the first excited state of the atom. Ans 10.2 eV**
   - **(ii) Determine (a) kinetic energy and (b) orbital radius in the first excited state of the atom. (Given, the value of the Bohr's radius = 0.53 Å. Ans (a) 3.4 eV (b) 2.12 Å**

8. **The electron in a given Bohr orbit has a total energy of -1.5 eV. Calculate its**
   - **(i) Kinetic Energy**
   - **(ii) Potential energy**

(iii) **Wavelength of radiation emitted, when this electron makes a transition to the ground state. [Given, energy in the ground state = -13.6 eV and Rydberg's constant =1.09 x 10^7 m^{-1}]** **Ans (i) 1.5 eV (ii) -3 eV (iii)** $\lambda = 1025$ Å

9. **Using postulates of Bohr's theory of hydrogen atom, show that**
   (i) **Radii of orbits increases as n^2 and**
   (ii) **The total energy of electron increases as $\frac{1}{n^2}$, where n is the principal quantum number of the atom.**

Chap 14 : Semiconductor Electronics

Important Questions for Board Exams

Board Weightage 7 Marks (Chap 14)

1. **Distinguish between conductors, insulators and semiconductors on the basis of conductivity and on the basis of energy bands.**

2. **What are the intrinsic & extrinsic semiconductors and also explain the conduction in N Type and P Type semiconductor on the basis of band theory.**

3. **State briefly the processes involved in the formation of p-n junction explaining clearly how the depletion region & potential barrier is formed.**

4. **With the help of circuit diagrams, distinguish between forward biasing & reverse biasing of p-n junction diode. Also draw V-I characteristics of a p-n junction diode in forward bias & in reverse bias.**

5. **Draw a labelled diagram of a full-wave rectifier circuit. State its working principle. Show the input-output waveforms.**

6. **Describe the working of Light Emitting diodes (LEDs). Which semiconductors are preferred to make LEDs and why? Give two advantages of using LEDs over conventional incandescent low power lamps.**

7. **Why is a zener diode considered as a special purpose semiconductor diode? Draw the I-V characteristics of Zener diode and explain briefly, how reverse current suddenly increase at the breakdown voltage?**

8. **Describe briefly with the help of a circuit diagram, how a zener diode works to obtain a constant DC voltage from the unregulated DC output of a rectifier.**

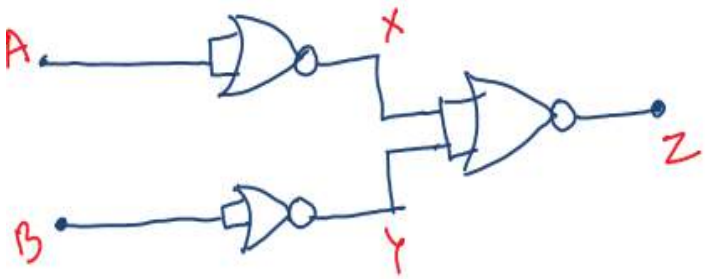
9. **Explain the action of a PNP transistor and an NPN transistor. (explain how conduction takes place in NPN and PNP transistor)**

10. **Draw the circuit diagram for studying the characteristics of an n-p-n transistor in common-emitter configuration. Sketch (a) input and (b) output characteristics in this configuration.**
    Also explain why is the base region of a transistor thin & lightly doped?

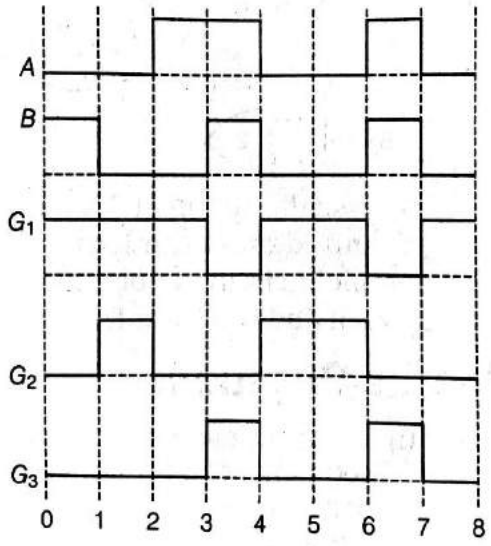
11. Draw a simple circuit of a CE transistor amplifier. Explain its working. Show that the voltage gain A_v of the amplifier is given by $A_v = -\frac{\beta_{AC} R_L}{r_i}$, Where β_{AC} is the current gain, R_L is the load resistance and r_i is the input resistance of the transistor. What is the significance of the negative sign in the expression of voltage gain?

12. Draw the logic circuit of AND, NOT & NAND gate and write its truth table.

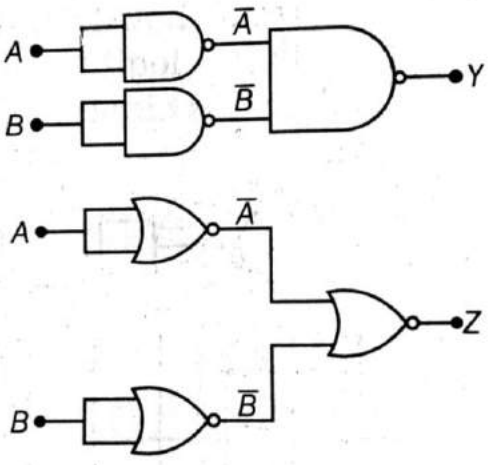
13. You are given a circuit below. Write its truth table. Hence identify the logic operation carried out by this circuit. Draw the logic symbol of the gate it corresponds to.



14. The inputs A & B shown here are used as the inputs for three different gates G1, G2 & G3. The outputs obtained in the three different cases have the forms shown. Identify the three gates and write their truth tables.



15. The two circuits shown here are a combination
(i) Three NAND gates
(ii) Three NOR gates.
Write the truth tables for each of these combinations.



16. The inputs A & B shown here are used as the inputs for three different gates G1, G2 & G3. The outputs obtained in the three different cases have the forms shown. Identify the three gates and write their truth tables.