S.R.D.A.V PUBLIC SCHOOL SAHARANPUR(2020-21)

ASSIGNMENT CLASS XII SCIENCE

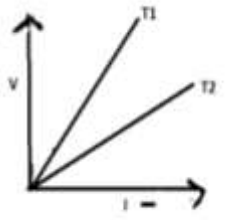
PHYSICS

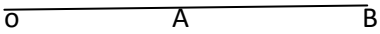
Physics Home Assignment Class XII:

Do the following question in separate note book.

1. Why two electric field lines can not intersect each other ?
2. Define the term conductivity of a metallic wire. Write its SI unit.
3. What do you mean by conservative nature of the electric force?
4. Define one coulomb of electric charge.
5. Why do the electric field lines not form any closed loop ?
6. Draw electric field lines for a system of two charges q_1 and q_2 such that (a) $q_1 q_2>0$, $q_1> q_2 >0$ (b) $q_1 q_2<0$, $|q_1| >|-q_2|$
7. When does an electric dipole placed in a non-uniform electric field experience a zero torque but non-zero force ?
8. What is the nature of force acting between two point charges q_1 and q_2 such that (a). $q_1 q_2>0$ (b). $q_1 q_2<0$
9. Two point charges +q and –q are placed at a distance d apart. What are the points at which the resultant electric field is parallel to the line joining the two charges ?
10. What is the value of $\left|\frac{E_{axial}}{E_{equitorial}}\right|$ for a short electric dipole ?
11. Does the charge given to a metallic sphere depend on whether it is hollow or solid ? give reason for your answer.
12. Two charges of magnitude –2Q and +Q are located at points (a, 0) and (4a,0) respectively. What is the electric flux due to these charges through a sphere of radius 3a with its centre at the origin ?
13. Name the physical quantity whose SI unit is V m. Is it a vector or a scalar quantity ?
14. Plot a graph showing the variation of resistance of a conducting wire as a function of its radius , keeping the length of the wire and its temperature as constant.
15. V-I graph for a metallic wire at two different temperatures T_1 and T_2 is as shown in the figure. Which of the two temperatures is higher and why ?
16. Why does the electric field inside a dielectric decreases whe it is placed in an external electric field ?
17. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. What is the potential at the centre of the sphere ?
18. Define dielectric strength of a medium. What is its value for vacuum ?
19. A point charge Q is placed at point O as shown in the figure. Is the potential difference $V_A – V_B$ positive , negative or zero , if Q is (a). positive (b). negative ?

Q





20. What is the geometrical shape of equipotential surfaces due to a single isolated charge ?
21. Two similar wires of same length and same area of cross –section but different material , having resistivity ρ_1 and ρ_2 are connected end to end (in series) . calculate the effective resistivity of their combination.
22. Two similar wires of same length and same area of cross –section but different material , having resistivity ρ_1 and ρ_2 are connected side by side (in parallel) . calculate the effective resistivity of their combination.
23. Two wires of equal length, one of copper and the other of manganin have the same resistance. Which wire is thicker ?
24. Distinguish between the emf and the potential difference across a cell.
25. Five identical cells , each of emf E and internal resistnce r , are connected in series to form (a) an open (b) a closed circuit. If an ideal voltmeter is connected across three cells, what will be its reading ?
26. Plot a graph showing the variation of current density (j) verses the electric field (E) for two conductors of different materials. What information from this plot regarding the properties of the conducting material, can be obtained which can be used to select suitable materials for use in making (a) standard resistance and (b) connecting wires in electric circuits ?
27. Two heating elements of resistancs R_1 and R_2 when operated at a constant supply of voltage V consume powers P_1 and P_2 respectively. Deduce the expressions for the power of their combination when they are , in turn , connected in (a) series and (b) parallel across the same voltage supply.
28. Two metallic wires , P_1 and P_2 of the same material and same length but different cross-sectional areas , A_1 and A_2 are joined together and connected to a source of emf. Find the ratio of the drift velocities of free electrons in the two wires when they are connected (a) in series , and (b) in parrellel.
29. The current flowing through a conductor is 2 mA at 50 V and 3mA at 60 V. is it an ohmic or non-ohmic conductor ? Give reason.
30. Current flowing through a wire varies with time t in second as I = (2t + 4) A. how much charge passes through a cross- section of wire in 2 s ?
31. Four identical cells , each of emf 2V , are joined in parallel providing supply of current to external circuit consisting of two 15 ohm resistors joined in parallel. The terminal voltage of the cells as read by ideal voltmeter is 1.6 V. calculate the internal resistance of each cell.
32. A wire whose cross sectional area is increasing linearly from its one end to the other , is connected across a battery of V volts. Which of the following quantities remain constant in the wire ? (a). drift speed (b). current density (c). electric current (d). electric field . justify your answer.
33. An emf of a cell is 1.5 V and its internal resistance is 1 ohm. For what current drawn from the cell will its terminal potential difference be half of its emf ?
34. Why is the potentiometer preferred to a voltmeter for measuring emf of a cell ?
35. Why copper is not used for making potentiometer wires ?
36. Why we use constantan wire for making resistance coil ?
37. Why should electrostatic field be zero inside a conductor ?
38. State the condition for maximum current to be drawn from a cell.

HOLIDAYS ASSIGNMENT(CLASS XII)

SUBJECT –CHEMISTRY

Q1:-Which aqueous solution has higher concentration – 1 molar or 1 molal solution of the same solute? Give reason.

Q2:- Why a person suffering from high blood pressure is advised to take minimum quantity of common salt?

Q3:- At higher altitudes , people suffer from a disease called anoxia . in this disease , they become weak & cannot think clearly. Give reason.

Q4:-2 gm of benzoic acid dissolved in 25 gm of benzene shows a depression in F.P. equal to 1.62K. Molal depression constant for benzene is 4.9 K Kg/mol. What is the % association of acid if it forms dimer in solution? **Ans:- 99.2 %**

Q5:- A solution containing 15gm urea (molar mass =60g/mol) per litre of solution in water is isotonic with a solution of glucose present in one litre of its solution . **Ans:- 45g**

Q6:- Write the cell reaction of (i) lead storage battery (ii) Fuel cell.

Q7:- Explain how rusting of iron is envisaged up of an electrochemical cell.

A8:-Calculate the equilibrium constant for the reaction:

$Cd^{2+}(aq) + Zn(s) \rightarrow Cd(s) + Zn^{2+}(aq)$

If Standard red. Potential of Cd & Zn are – 0.403 V & – 0.763 V . **Ans:-1.58 X10^{12}**

Q9:-conductivity of 0.00241 M acetic acid solution is 7.896 X 10 $^{-5}$ S/cm. Calculate its molar conductivity in this solution . if λm^0 for acetic acid is 390.5 Scm^2/mol, what would be its dissociation constant? **(Ans:- 1.86 X10 $^{-5}$)**

Q10:- A voltaic cell is set up at 25 °C with the following half cells:

Al/Al3+(0.001M) & Ni/Ni2+(0.50M).

Calculate the cell voltage (given If Standard red. Potential of Ni & Al are – 0.25 V & – 1.66 V)

Ans:- 1.46 V

Q11:- Find an expression for rate constant for Ist order reaction . Plot graph between log [R] & t. Give its slope also.

Q12:- Define the following :

1. Elementary reaction
2. rate of reaction
3. rate constant
4. Activation energy
5. Pseudo first order reaction

Q13:-The rate constant of a Ist order reaction increases 2 x10-2 to 4 x 10-2 when the temp. changes from 300K to 310K.Calculate the energy of activation.(log2= 0.3010). **(Ans:- 53.59kj/mol)**

Q14:- Show that in a first order reaction , time required for completion 99.9% is 10 times that of half life of the reaction.

Note :- Do all question of NCERT text book

Activity:- 1. Collect 3 different soaps 10 gm each. Dissolve in 50 gm water in separate container & put them for 10 minutes to form foams. Find the soap which has better forming capacity.

2. Make a list of polymers which are used in everyday life.

Note :- for these activities u can take help of internet.

Class- XII

Subject- Biology

Prepare investigatory project on topic of your choice.

Kindly ensure that it is included in CBSE biology curriculum.

1

Relations and Functions

MULTIPLE CHOICE QUESTIONS (MCQs)

Choose the correct answer from the given four options in each of the following questions from 1 to 35 :

1. Let R be the relation in the set $\{1, 2, 3, 4\}$ given by $R = \{(1, 2), (2, 2), (1, 1), (4, 4), (1, 3), (3, 3), (3, 2)\}$. Choose the correct answer.
   (a) R is reflexive and symmetric but not transitive
   (b) R is reflexive and transitive but not symmetric
   (c) R is transitive and symmetric but not reflexive
   (d) R is an equivalence relation
2. If R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$, then
   (a) $(2, 4) \in R$ (b) $(3, 8) \in R$ (c) $(6, 8) \in R$ (d) $(8, 7) \in R$
3. If R be the relation in the set $\{1, 2, 3\}$ given by $R = \{(1, 2), (2, 1)\}$, then
   (a) R is reflexive but neither symmetric nor transitive
   (b) R is symmetric but neither reflexive nor transitive
   (c) R is transitive but neither symmetric nor reflexive
   (d) R is an equivalence relation
4. Let $A = \{1, 2, 3\}$ and consider the relation $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)\}$, then R is
   (a) reflexive but not symmetric
   (b) reflexive but not transitive
   (c) symmetric and transitive
   (d) neither symmetric nor transitive
5. Let $f : R \to R$ be defined by

$$f(x) = \begin{cases} 2x, & x > 3 \\ x^2, & 1 < x \le 3 \\ 3x, & x \le 1 \end{cases}$$

   Then $f(-1) + f(2) + f(4)$ is
   (a) 9 (b) 11 (c) 5 (d) none of these

6. For real numbers x and define xRy if and only if $x - y + \sqrt{2}$ is an irrational number. Then the relation R is
(a) reflexive (b) symmetric (c) transitive (d) none of these

7. The relation R in R defined as $R = \{(a, b) : a \le b^2\}$. Then R is
(a) reflexive but not symmetric
(b) neither reflexive nor symmetric nor transitive
(c) symmetric and transitive
(d) reflexive but not transitive

8. Let $A = R - \{3\}$ and $B = R - \{1\}$. Let $f : A \to B$ is defined by $f(x) = \frac{x-2}{x-3} \forall\, x \in R$. Choose the correct answer.
(a) f is injective (b) f is surjective
(c) f is bijective (d) none of these

9. Let R be the relation on the set R of all real numbers defined by aRb if $|a - b| \le 1$. Then R is
(a) reflexive and symmetric (b) symmetric only
(c) transitive only (d) anti-symmetric only

10. Let S be the set of real numbers. Then the relation $R = \{(a, b) : 1 + ab > 0\}$ on S is
(a) reflexive and symmetric but not transitive
(b) reflexive and transitive but not symmetric
(c) symmetric and transitive but not reflexive
(d) reflexive, symmetric and transitive

11. Let a relation R on the set N of natural numbers be defined as $xRy \Leftrightarrow x^2 - 4xy + 3y^2 = 0 \forall x, y \in N$. The relation is
(a) reflexive (b) symmetric
(c) transitive (d) an equivalence relation

12. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$ and $g(x) = \left(\frac{3x + x^3}{1 + 3x^2}\right)$ then $f\{g(x)\}$ equals
(a) $-f(x)$ (b) $-3f(x)$ (c) $3f(x)$ (d) $[f(x)]^3$

13. If $f(x) = \frac{x+1}{x-1}, x \ne 1$, then $(fofofof)$ is equal to
(a) $\frac{1}{x}$ (b) x
(c) x^2 (d) indeterminate

14. If $A = \{1, 2, 3\}$ and $B = \{a, b\}$ then total number of functions from A to B is
(a) 8 (b) 6 (c) 9 (d) 16

15. Let $f : R \to R$ is defined by $f(x) = x^2$, find $f^{-1}(-25)$.
(a) 5 (b) 25
(c) -25 (d) none of these

16. What is the range of the function $f(x) = \frac{[x-1]}{x-1}$?
(a) $\{1, 2\}$ (b) $\{1, -1\}$ (c) $\{1, 0\}$ (d) $\{-1, 0\}$

17. If $f(x) = 4 - (x - 7)^3$ then $f^{-1}(x)$ is
(a) $f^{-1}(x) = 4 - (x - 7)^{1/3}$ (b) $f^{-1}(x) = 7 - (4 + x)^{1/3}$
(c) $f^{-1}(x) = 7 + (4 - x)^{1/3}$ (d) none of these

18. Let $f : R \to R$ is defined by $f(x) = (3 - x^3)^{1/3}$, then $fof(x)$ is
(a) x (b) x^3 (c) $3x^2$ (d) $x^{1/3}$

19. Let $A = \{1, 2, 3\}$. Then number of equivalence relation containing $(1, 2)$ is
(a) 1 (b) 2 (c) 3 (d) 4

20. Let $A = \{1, 2, 3\}$. Then number of relations containing $(1, 2)$ and $(1, 3)$ which are reflexive and symmetric but not transitive is
(a) 1 (b) 2 (c) 3 (d) 4

21. Let $A = \{1, 2, 3\}$. Then number of relations containing $(1, 2)$ and $(2, 3)$ which are reflexive and transitive but not symmetric is
(a) 1 (b) 2 (c) 3 (d) 4

22. The number of equivalence in the set $A = \{1, 2, 3\}$ containing $(1, 2)$ and $(2, 1)$ is
(a) 1 (b) 2 (c) 3 (d) 4

23. The number of all one-one functions from set $A = \{1, 2, 3, 4\}$ to itself is
(a) 4 (b) 24 (c) 16 (d) 27

24. The number of all onto functions from the set $A = \{1, 2, 3, \ldots, n\}$ to itself is
(a) n (b) $n + 1$ (c) $n!$ (d) $(n - 1)!$

25. The number of all relations from set $A = \{1, 2, 3\}$ to itself is
(a) 3 (b) 8 (c) 16 (d) 3!

26. If $f : R \to R$ is defined by $f(x) = 5x + 3$, then f is
(a) f is one-one onto
(b) f is many one onto
(c) f is one-one but not onto
(d) f is neither one-one nor onto

25. (b) 26. (a) 27. (d) 28. (d) 29. (d) 30. (b)
31. (d) 32. (a) 33. (d) 34. (b) 35. (b)
36. $\cos x^2$ 37. n!
38. Reflexive relation i.e., {(a, a), (b, b), (c, c)} 39. 2 and −1
40. {(3, 8), (6, 6), (9, 4), (12, 2)}
41. {(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 2), (3, 3), (4, 4), (5, 5)}
42. Reflexive and symmetric but not transitive
44. $4x^2 + 1$ and $4x^2 + 1$ as $ho(gof) = (hog)of$
45. Prove $g[f(x)] = x$ and $f[g(x)] = x$
46. The inverse of f is f itself 49. $gof = \{(1, 3), (3, 1), (4, 3)\}$
50. $f^{-1} = \{(2, 1), (4, 2), (1, 3), (3, 4)\}$
51. 0 52. $2^n - 2$

PREVIOUS YEARS CBSE (XII) QUESTIONS

1. If the binary operation * on the set of integers Z, is defined by $a * b = a + 3b^2$, then find the value of 2 * 4. *[2009, 12]*
2. Let * be a binary operation on N given by $a * b$ = H.C.F. (a, b), $a, b \in N$. Write the value of 22 * 4. *[2009, 12]*
3. What is the range of $\frac{|x-1|}{x-1}$? *[2010]*
4. If $f : R \to R$ be defined by $f(x) = (3 - x^3)^{1/3}$, then find $fof(x)$. *[2010]*
5. If $f : R \to R$ is defined by $f(x) = 3x + 2$, find $f(f(x))$. *[2010 Compt.]*
6. If the function $f : R \to R$, defined by $f(x) = 3x - 4$, is invertible, find f^{-1}. *[2010 Compt.]*
7. If $f : R \to R$ and $g : R \to R$ are given by $f(x) = \sin x$ and $g(x) = 5x^2$, find $gof(x)$. *[2010]*
8. Write fog, if $f : R \to R$ and $g : R \to R$ are given by $f(x) = |x|$ and $g(x) = |5x - 2|$. *[2011]*
9. State the reason for the relation R in the set {1, 2, 3} given by $R = \{(1, 2), (2, 1)\}$ not to be transitive. *[2011]*
10. Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and let $f = \{(1, 4), (2, 5), (3, 6)\}$ be a function from A to B. State whether f is one-one or not. *[2011]*
11. The binary operation $* : R \times R \to R$, is defined by $a * b = 2a + b$, find $(2 * 3) * 4$. *[2012]*
12. If $f : R \to R$ defined as $f(x) = \frac{2x-7}{4}$ is an invertible function, write $f^{-1}(x)$. *[2012 Compt.]*
13. Let * be a binary operation on the set of all non-zero real numbers, given by $a * b = \frac{ab}{5}$ for all $a, b \in R - \{0\}$. Find the value of x given that $2 * (x * 5) = 10$. *[2014]*
14. If $R = \{(x, y) : x + 2y = 8\}$ is a relation on N, write the range of R. *[2014]*
15. If $a * b$ denotes the larger of 'a' and 'b' and if $a \circ b = (a * b) + 3$, then write the value of $(5) \circ (10)$, where * and $\circ$ are binary operations. *[2018]*
16. Find the identity element in the set Q^+ of all positive rational numbers for the operation * defined by $a * b = \frac{3ab}{2}$ for all $a, b \in Q_+$. *[2018 Compt.]*
17. Let * be an operation defined as $* : R \times R \to R$ such that $a * b = 2a - b$, $a, b \in R$. Check if * is a binary operation. If yes, find if it is associative too. *[2019]*
18. Let $* : N \times N \to N$ be an operation defined as $a * b = a + ab$, $\forall a, b \in N$. Check if * is a binary operation. If yes, find if it is associative too. *[2019]*
19. If $f : R \to R$ is given by $f(x) = (3 - x^3)^{\frac{1}{3}}$, find $fof(x)$. *[2019 Compt.]*
20. If $f(x) = \frac{4x+3}{6x-4}$, $x \neq \frac{2}{3}$, find $fof(x)$. *[2019 Compt.]*

ANSWERS

1. 50 2. 2 3. (−1, 1) 4. x 5. $9x + 8$
6. $\frac{x+4}{3}$ 7. $5\sin^2 x$ 8. $|5x - 2|$ 9. $(1, 1) \notin R$
10. One-one 11. 18 12. $\frac{4x+7}{2}$ 13. $x = 25$ 14. {1, 2, 3}
15. 13 16. $e = \frac{2}{3}$ 17. Not associative 18. No
19. x 20. $fof(x) = x$

27. If $f : R \to R$ is defined by $f(x) = x^4$, then f is
(a) f is one-one onto (b) f is many one onto
(c) f is one-one but not onto (d) f is neither one-one nor onto

28. If $f : R \to R$ is defined by $f(x) = 1 + x^2$, then f is
(a) f is one-one onto (b) f is many one onto
(c) f is one-one but not onto (d) f is neither one-one nor onto

29. Let R be relation on N defined by $x + 2y = 8$. The domain of R is
(a) {2, 4, 8} (b) {2, 4, 6} (c) {2, 4, 6, 8} (d) {2, 4, 8, 10}

30. If $f : R \to R$ is defined by $f(x) = \cos x, \forall x \in R$, then f is
(a) f is one-one onto (b) f is many one onto
(c) f is one-one but not onto (d) f is neither one-one nor onto

31. If $f : R \to R$ is defined by $f(x) = |x|, \forall x \in R$, then f is
(a) f is one-one onto (b) f is many one onto
(c) f is one-one but not onto (d) f is neither one-one nor onto

32. If $f(x)$ be a greatest integer function and $g(x)$ be an absolute value function, find the value of

$$(fog)\left(\frac{-3}{2}\right) + (gof)\left(\frac{\pi}{3}\right)$$

(a) 2 (b) −2 (c) 1 (d) −1

33. If $f : R \to R$ and $g : R \to R$ are defined by $f(x) = x - 3$ and $g(x) = x^2 + 1$, then find values of x for which $g[f(x)] = 10$ are
(a) 0, −6 (b) 2, −2 (c) 1, −1 (d) 0, 6

34. If $f(x) = \sin^2 x$ and the composite function $g(f(x)) = |\sin x|$, then the function $g(x)$ is equal to
(a) $-\sqrt{x}$ (b) $\sqrt{x}$ (c) $\sqrt{x-1}$ (d) $\sqrt{x+1}$

35. If $f : R \to R$ is given by $f(x) = \begin{cases} -1, & \text{when } x \text{ is rational} \\ 1, & \text{when } x \text{ is a irrational} \end{cases}$

Then, $(fof)(1 - \sqrt{3})$

(a) 1 (b) −1 (c) $\sqrt{3}$ (d) 0

Fill in the blanks in each of the following questions from 36 to 41 :

36. Let $f : R \to R$ be defined by $f(x) = \cos x$ and $g : R \to R$ defined by $g(x) = x^2$, then fog is _____.

37. Consider a set A containing n elements. Then, the total number of injective functions from A onto itself is _____.

38. Consider the set $A = \{a, b, c\}$ and R be the smallest equivalence relation in A, then R is _____.

39. If $f = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function and f is described by $f(x) = \alpha x + \beta$ then value of α and β is _____.

40. The relation R be defined in N by a R b if $2a + 3b = 30$. Then R is _____.

41. Let the relation R on the set $A = \{1, 2, 3, 4, 5\}$ and by $R = \{(a, b) : |a^2 - b^2| < 5\}$. Then R is _____.

Following questions from 42 to 52 are to be answered as per the exact requirement of the question :

42. Let $A = \{0, 1, 2, 3\}$ and define a relation R on A as follows :
$R = \{(0, 0), (0, 1), (0, 3), (1, 0), (1, 1), (2, 2), (3, 0), (3, 3)\}$.
Is R reflexive? symmetric? transitive?

43. Show that the relation R in the set $\{1, 2, 3\}$ given by $R = \{(1, 2), (2, 1)\}$ is symmetric.

44. If $f : x \to 2x$, $g : x \to x^2$ and $h : x \to x + 1$, find $ho(gof)$ and $(hog)of$.

45. Prove $f(x) = \frac{2x}{3 - x}$ and $g(x) = \frac{3x}{x + 2}$ are inverses of each other.

46. If $f(x) = \frac{4x + 3}{6x - 4}, x \neq \frac{2}{3}$, show that $(fof)\ x = x$, for all $x \neq \frac{2}{3}$.
What is the inverse of f?

47. Show that the relation '⊂' with respect to sets is not an equivalence relation.

48. Show that the modulus function $f : R \to R$ given by $f(x) = |x|$ is neither one-one nor onto.

49. Let $f = \{1, 3, 4\} \to \{1, 2, 5\}$ and $g = \{1, 2, 5\} \to \{1, 3\}$ be given by $f = \{(1, 2), (3, 5), (4, 1)\}$ and $g = \{(1, 3), (2, 3), (5, 1)\}$. Write down gof.

50. If $A = \{1, 2, 3, 4\}$ and the function $f = \{(1, 2), (2, 4), (3, 1), (4, 3)\}$, write f^{-1}.

51. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mapping from A to B is.

52. Let $A = \{1, 2, 3, \ldots n\}$ and $B = \{a, b\}$. Then number of surjections from A into B is.

ANSWERS

1. (b)	2. (c)	3. (b)	4. (a)	5. (a)	6. (a)
7. (b)	8. (c)	9. (a)	10. (a)	11. (a)	12. (c)
13. (b)	14. (a)	15. (d)	16. (b)	17. (c)	18. (a)
19. (b)	20. (a)	21. (c)	22. (b)	23. (b)	24. (c)

2 Inverse Trigonometric Functions

MULTIPLE CHOICE QUESTIONS (MCQs)

Choose the correct answer from the given four options in each of the following questions from 1 to 34 :

1. The value of $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$ is

(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{6}$ (d) none of these

2. The value of $\cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$ is

(a) $\frac{\pi}{3}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{\pi}{6}$ (d) none of these

3. The greatest and least value of $(\sin^{-1}x)^2 + (\cos^{-1}x)^2$ are respectively

(a) $\frac{5\pi^2}{4}$ and $\frac{\pi^2}{8}$ (b) $\frac{\pi}{2}$ and $\frac{-\pi}{2}$

(c) $\frac{\pi^2}{4}$ and $\frac{-\pi^2}{8}$ (d) $\frac{\pi^2}{4}$ and 0

4. If $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$, then x equal to

(a) $\frac{\pi}{3}$ (b) $-\frac{\sqrt{3}}{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) none of these

5. The value of $\cot^{-1}2 + \cot^{-1}3$ is

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{4}$ (c) $\frac{2\pi}{3}$ (d) none of these

6. Find the value of : $\tan^{-1}(1) + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right)$.

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) none of these

7. If $\sin^{-1}x = y$, then :

(a) $0 \le y \le \pi$ (b) $\frac{-\pi}{2} \le y \le \frac{\pi}{2}$

(c) $0 < y < \pi$ (d) $\frac{-\pi}{2} < y < \frac{\pi}{2}$

8. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to

(a) π (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{-\pi}{3}$

9. $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\frac{x-y}{x+y}$ is equal to

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{-3\pi}{4}$

10. $\sin(\tan^{-1}x)$, $|x| < 1$ is equal to

(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

11. If $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \frac{\pi}{2}$, then value of $xy + yz + zx$ is

(a) 1 (b) 0 (c) $\frac{\pi}{2}$ (d) none of these

12. If $a > b > c > 0$ $(0 < ab, bc, ca < 1)$, then

$\cot^{-1}\left(\frac{ab+1}{a-b}\right) + \cot^{-1}\left(\frac{cb+1}{b-c}\right) \cot^{-1}\left(\frac{ac+1}{c-a}\right)$ is equal to

(a) 0 (b) 1 (c) $\frac{\pi}{2}$ (d) none of these

13. The value of $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right]$, $|x| < 1, y > 0$ and $xy < 1$ is

(a) $\frac{x-y}{1+xy}$ (b) $\frac{x+y}{1-xy}$ (c) $\frac{x+y}{1-xy}$ (d) none of these

14. The value of $\sin^{-1}\frac{\sqrt{2}}{2} - \sin^{-1}\frac{1}{2}$ is

(a) $\frac{\pi}{12}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) none of these

15. The value of $\sin^{-1}\left(\frac{1}{\sqrt{10}}\right) + \sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{3}$ (d) none of these

16. The number of solutions of the equations $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$ is

(a) 2 (b) 3 (c) 4 (d) none of these

17. If $A = \tan^{-1}\left(\frac{\sqrt{3}x}{2y - x}\right)$ and $B = \tan^{-1}\left(\frac{2x - y}{\sqrt{3}y}\right)$, then $A - B$

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) none of these

18. The principal value of $\cos^{-1}(\cos 680°)$ is

(a) 40° (b) 60° (c) 90° (d) none of these

19. The value of $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{8}\right)$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) none of these

20. $\cos^{-1}\sqrt{\frac{1 + \sqrt{1 + x^2}}{2\sqrt{1 + x^2}}}$ is equal to

(a) $\tan^{-1} x$ (b) $\frac{1}{2}\tan^{-1} x$ (c) $\tan^{-1} x^2$ (d) none of these

21. The value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$ is

(a) $\frac{2\pi}{5}$ (b) $\frac{2\pi}{3}$ (c) $\frac{3\pi}{5}$ (d) none of these

22. The value of $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is

(a) $\frac{\pi}{5}$ (b) $\frac{-\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) none of these

23. The value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ is

(a) $\frac{5\pi}{6}$ (b) $\frac{\pi}{6}$ (c) $\frac{7\pi}{6}$ (d) none of these

24. The value of $\sin^{-1}\left[\cos\left(\frac{33\pi}{5}\right)\right]$ is

(a) $\frac{\pi}{10}$ (b) $\frac{-\pi}{10}$ (c) $\frac{3\pi}{5}$ (d) none of these

25. The value of $\tan\left(\cos^{-1}\frac{3}{5} + \tan^{-1}\frac{1}{4}\right)$ is

(a) $\frac{19}{10}$ (b) $\frac{19}{8}$ (c) $\frac{3}{5}$ (d) none of these

26. The value of $\tan^2(\sec^{-1} 2) + \cot^2(\operatorname{cosec}^{-1} 3)$ is

(a) 11 (b) 13 (c) 23 (d) none of these

27. The value of $\sin^{-1}\left[\cos^{-1}\left(\frac{43\pi}{5}\right)\right]$ is

(a) $\frac{\pi}{10}$ (b) $\frac{-\pi}{10}$ (c) $\frac{3\pi}{5}$ (d) none of these

28. The principal value of $\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$ is

(a) $\frac{2\pi}{3}$ (b) $\frac{-\pi}{3}$ (c) $\frac{3\pi}{2}$ (d) none of these

29. The value of $\cos\left(\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{5}{13}\right)$ is

(a) $\frac{30}{65}$ (b) $\frac{33}{15}$ (c) $\frac{33}{65}$ (d) none of these

30. The value of $\tan\frac{1}{2}\left(\cos^{-1}\frac{\sqrt{5}}{3}\right)$ is

(a) $\frac{1}{2}(3 - \sqrt{5})$ (b) $\frac{1}{2}(3 + \sqrt{5})$

(c) $\frac{1}{5}(3 + \sqrt{5})$ (d) none of these

31. The value of $\tan\left(2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right)$ is

(a) $\frac{-7}{17}$ (b) $\frac{7}{17}$ (c) $\frac{-7}{5}$ (d) none of the

32. The principal value branch of $\text{cosec}^{-1}x$ is

(a) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]-\{0\}$ (b) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

(c) $[0,\pi]-\left\{\frac{\pi}{2}\right\}$ (d) none of these

33. The principal value branch of $\cot^{-1}x$ is

(a) $(0,\pi)$ (b) $\left(0,\frac{\pi}{2}\right)$ (c) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ (d) none of the

34. The principal value branch of $\sec^{-1}x$ is

(a) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]-\{0\}$ (b) $[0,\pi]-\left\{\frac{\pi}{2}\right\}$

(c) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ (d) none of these

Fill in the blanks in each of the following questions from 35 to 45 :

35. The solution of $\cos^{-1}[\sin^{-1}(\cos^{-1}x)]=\frac{\pi}{3}$ is _____.

36. The solution of $\tan^{-1}(x+2)+\tan^{-1}(2-x)=\tan^{-1}\left(\frac{2}{3}\right)$ is _____.

37. The solution of $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$ is _____.

38. The solution of $\cos(\sin^{-1}x)=\frac{1}{9}$ is _____.

39. The solution of $\sin\left(\frac{1}{5}\cos^{-1}x\right)=1$ is _____.

40. The solution of $\sin[\cot^{-1}(x+1)]=\cos(\tan^{-1}x)$ is _____.

41. The value of $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$ is _____.

42. The value of $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$ is _____.

43. The value of $\sin\left[2\cot^{-1}\left(\frac{-5}{12}\right)\right]$ is _____.

44. The domain of $\sin^{-1}2x$ is _____.

45. If $x=\sin^{-1}[\sin(-600°)]$, then value of x is _____.

Prove the following questions from 46 to 67 :

46. Prove that $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{2}{11}=\tan^{-1}\frac{3}{4}$.

47. Prove that $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]=\frac{\pi}{4}$.

48. Prove that $2\sin^{-1}\frac{3}{5}=\tan^{-1}\frac{24}{7}$.

49. Prove that $\tan^{-1}x+\cot^{-1}(x+1)=\tan^{-1}(x^2+x+1)$.

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

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

52. Prove that $\frac{9\pi}{8}-\frac{9}{4}\sin^{-1}\frac{1}{3}=\frac{9}{4}\sin^{-1}\frac{2\sqrt{2}}{3}$.

53. Prove that $\sin(\tan^{-1}\sqrt{3}+\cot^{-1}\sqrt{3})=1$.

54. Prove that $2\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{7}=\frac{\pi}{4}$.

55. Prove that $4(\cot^{-1}3+\text{cosec}^{-1}\sqrt{5})=\pi$.

56. Prove that $\cot\left(\frac{\pi}{4}-2\cot^{-1}3\right)=7$.

57. Prove that $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{2}{11}=\tan^{-1}\frac{3}{4}$.

58. If $\sin^{-1}x+\sin^{-1}y=\frac{\pi}{2}$, then prove $\cos^{-1}x+\cos^{-1}y=\frac{\pi}{2}$.

59. Show that the domain of the function $y=\cos^{-1}(x^2-4)$ is $[-\sqrt{5},-\sqrt{3}]\cup[\sqrt{3},\sqrt{5}]$.

60. Show that the domain of the function $y = \sin^{-1}(-x^2)$ is $[-1, 1]$.
61. Prove that $\cos^{-1}(-x) = \pi - \cos^{-1} x$, $x \in [-1, 1]$.
62. Prove that $\cot^{-1}(-x) = \pi - \cot^{-1} x$, $x \in R$.
63. Prove that $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$, $\forall\, x \in [-1, 1]$.
64. Prove that $\sec^{-1} x + \operatorname{cosec}^{-1} x = \frac{\pi}{2}$, $\forall\, x \in R - [-1, 1]$.
65. If $x^2 < 1$ then prove $2\tan^{-1} x = \tan^{-1}\frac{2x}{1-x^2}$.
66. Prove that $3\tan^{-1} x = \tan^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$, if $x \in \left[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]$.
67. Prove that $2\cos^{-1} x = \cos^{-1}(2x^2 - 1)$, if $0 \le x \le 1$.

ANSWERS

1. (b)	2. (a)	3. (a)	4. (c)	5. (b)	6. (c)
7. (b)	8. (d)	9. (c)	10. (d)	11. (a)	12. (a)
13. (b)	14. (a)	15. (a)	16. (a)	17. (b)	18. (a)
19. (c)	20. (b)	21. (a)	22. (b)	23. (a)	24. (b)
25. (b)	26. (a)	27. (b)	28. (a)	29. (c)	30. (a)
31. (a)	32. (a)	33. (a)	34. (b)	35. $\frac{\sqrt{3}}{2}$	
36. $x = \mp 3$		37. $\frac{1}{5}$	38. $\frac{\mp 4\sqrt{5}}{9}$	39. No solution	
40. $\frac{-1}{2}$	41. $\frac{\pi}{8}$	42. $\frac{\pi}{6}$	43. $\frac{-120}{169}$	44. $\left[-\frac{1}{2}, \frac{1}{2}\right]$	45. $\frac{\pi}{3}$

PREVIOUS YEARS CBSE (XII) QUESTIONS

1. Find the value of $\cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\frac{2\pi}{3}\right)$. [2008, 11
2. Find the value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$. [2009
3. Find the value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$. [2009, 11

4. Find the value of $\sin^{-1}\left(-\frac{1}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$. [2010, 11 Compt. type]
5. Find the value of $\sin^{-1}\left(\sin\frac{4\pi}{5}\right)$. [2010]
6. Find the value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$. [2011]
7. Find the value of $\cos^{-1}\left(\frac{1}{2}\right) - 2\sin^{-1}\left(-\frac{1}{2}\right)$. [2012]
8. Find the value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$. [2012]
9. Find the value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right)$. [2013]
10. Find the value of $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$. [2018]
11. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$, then find the value of x. [2014]
12. If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$, $xy < 1$, then write the value of $x + y + xy$. [2014]
13. Prove that $3\sin^{-1} x = \sin^{-1}(3x - 4x^3)$, $x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$. [2018]
14. Prove that $3\cos^{-1} x = \cos^{-1}(4x^3 - 3x)$, $x \in \left[\frac{1}{2}, 1\right]$. [2018 Compt.]
15. Find the value of $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$. [2018 Compt.]

ANSWERS

1. π	2. $\frac{2\pi}{3}$	3. $\frac{5\pi}{6}$	4. $\frac{\pi}{2}$	5. $\frac{\pi}{5}$	6. 1	7. $\frac{2\pi}{3}$
8. $\frac{-\pi}{3}$	9. $\frac{11\pi}{12}$	10. $\frac{-\pi}{2}$	11. $\frac{1}{5}$	12. 1	15. $-\frac{\pi}{3}$	

3

Matrices

MULTIPLE CHOICE QUESTIONS (MCQs)

Choose the correct answer from the given four options in each of the following questions from 1 to 47 :

1. If A and B are symmertric matrices of same order, then $AB - BA$ is a
   (a) skew-symmetric matrix (b) symmetric matrix
   (c) zero matrix (d) identity matrix

2. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then $A + A' = I$, if the value of α is
   (a) $\pi/6$ (b) $\pi/3$ (c) $3\pi/2$ (d) π

3. Matrices A and B will be inverses of each other only if
   (a) $AB = BA$ (b) $AB = BA = 0$
   (c) $AB = 0, BA = I$ (d) $AB = BA = I$

4. For what value of x : $\begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$?
   (a) -1 (b) 0 (c) 2 (d) none of these

5. The values of x, y, z if the matrix $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ which satisfy the equation $AA' = I$.
   (a) $x = \mp\frac{1}{\sqrt{2}}, y = \mp\frac{1}{\sqrt{6}}, z = \mp\frac{1}{\sqrt{3}}$
   (b) $x = \frac{1}{\sqrt{2}}, y = \frac{1}{\sqrt{6}}, z = \frac{1}{\sqrt{3}}$
   (c) $x = \frac{-1}{\sqrt{2}}, y = \frac{-1}{\sqrt{6}}, z = \frac{-1}{\sqrt{3}}$
   (d) None of the above

6. If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to
   (a) A (b) $I - A$ (c) I (d) $3A$

7. If the matrix A is both symmetric and skew-symmetric, then
   (a) A is a diagonal matrix (b) A is a zero matrix
   (c) A is a square matrix (d) none of these

8. If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that $A^2 = I$, then
   (a) $1 + \alpha^2 + \beta\gamma = 0$ (b) $1 - \alpha^2 + \beta\gamma = 0$
   (c) $1 - \alpha^2 - \beta\gamma = 0$ (d) $1 + \alpha^2 - \beta\gamma = 0$

9. The values of x, y and z from the equations $\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$ are
   (a) $x = 2, y = 4, z = 3$ (b) $x = 4, y = 2, z = 3$
   (c) $x = 2, y = 3, z = 4$ (d) none of these

10. The value of k, a non-zero scalar, if $2\begin{bmatrix} 1 & 2 & 3 \\ -1 & -3 & 2 \end{bmatrix} + k\begin{bmatrix} 1 & 0 & 2 \\ 3 & 4 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 4 & 10 \\ 4 & 2 & 14 \end{bmatrix}$ is
    (a) 1 (b) 2 (c) 0 (d) none of these

11. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $A^2 - 5A + 7I$ is
    (a) 0 (b) I (c) A (d) none of these

12. If A and B are square matrices of same order and B is a skew-symmetric matrix then $A'BA$ is a
    (a) skew-symmetric matrix (b) symmetric matrix
    (c) zero matrix (d) identity matrix

13. If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is a symmetric matrix, then x is
    (a) 5 (b) 3 (c) 4 (d) none of these

14. If the matrix $A = \begin{bmatrix} 5 & x & -1 \\ 4 & -2 & -3 \\ 7 & 2 & 2 \end{bmatrix}$ is a singular matrix, then value of x
    (a) $x = \frac{-12}{29}$ (b) $x = \frac{12}{29}$ (c) $x = \frac{12}{19}$ (d) none of these

15. Given that $A = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$ and $A(adj\ A) = k\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, fin value of k

(a) 1 (b) 2 (c) 0 (d) none of the

16. For any two matrices A and B, we have

(a) $AB = BA$ (b) $AB \neq BA$ (c) $AB = 0$ (d) none of the

17. If A and B are square matrices of the same order, then $(A + B)(A - B)$ is equal to :

(a) $A^2 - B^2$ (b) $A^2 - BA - AB - B^2$

(c) $A^2 - B^2 + BA - AB$ (d) $A^2 - BA + B^2 + AB$

18. If $A = \begin{bmatrix} 2 & -1 & 3 \\ -4 & 5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & -2 \\ 1 & 5 \end{bmatrix}$, then

(a) only AB is defined (b) only BA is defined

(c) AB and BA both are defined (d) AB and BA both are defined

19. The matrix $A = \begin{bmatrix} 0 & 0 & 5 \\ 0 & 5 & 0 \\ 5 & 0 & 0 \end{bmatrix}$ is a

(a) scalar matrix (b) diagonal matrix

(c) unit matrix (d) square matrix

20. If A and B are symmetric matrices of the same order, then $AB' - BA'$ is a

(a) skew-symmetric matrix (b) symmetric matrix

(c) zero matrix (d) identity matrix

21. Construct $A_{2\times 2}$ matrix where $a_{ij} = |-i + j|$

(a) $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ (d) none of these

22. Find values of a and b if $A = B$, where

$$A = \begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix}, B = \begin{bmatrix} 2a+2 & b^2+2 \\ 8 & b^2-5b \end{bmatrix}$$

(a) $a = 2$ and $b = 2$ (b) $a = -2$ and $b = 2$

(c) $a = -2$ and $b = -2$ (d) none of these

23. Solve for x and y : $x\begin{bmatrix} 2 \\ 1 \end{bmatrix} + y\begin{bmatrix} 3 \\ 5 \end{bmatrix} + \begin{bmatrix} -8 \\ -11 \end{bmatrix} = 0$

(a) $x = 1$ and $y = 2$ (b) $x = -1$ and $y = 2$

(c) $x = 1$ and $y = -2$ (d) none of these

24. The sum of matrices $A = \begin{bmatrix} 1 & -3 \\ 4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 & 0 \\ -4 & -5 & 0 \end{bmatrix}$ is

(a) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(c) not possible (d) none of these

25. Total number of possible matrices of order 3×3 with each entry 2 or 0.

(a) 9 (b) 27 (c) 81 (d) 512

26. If A and B are two matrices of the order $3 \times m$ and $3 \times n$, respectively, and $m = n$, then the order of matrix $(5A - 2B)$ is

(a) $m \times 3$ (b) 3×3 (c) $m \times n$ (d) $3 \times n$

27. If A is matrix of order $m \times n$ and B is a matrix such that AB' and BA' are defined, then order of matrix B is

(a) $m \times m$ (b) $n \times n$ (c) $n \times m$ (d) $m \times n$

28. If matrix $A = [a_{ij}]_{2\times 2}$, where $a_{ij} = 1$ if $i \neq j$ and $a_{ij} = 0$ if $i = j$ then A^2 is equal to :

(a) I (unit matrix) (b) A

(c) O (d) none of these

29. On using elementary operations $R_1 \to R_1 - 3R_2$ in the following equation $\begin{bmatrix} 4 & 2 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$, we have

(a) $\begin{bmatrix} -5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & -7 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} -5 & -7 \\ 3 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 7 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & -7 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -7 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 1 & -7 \\ 0 & 3 \end{bmatrix}\begin{bmatrix} -2 & 0 \\ 1 & 1 \end{bmatrix}$

30. If $A = \begin{bmatrix} 5 & x \\ y & 0 \end{bmatrix}$ and A is symmetric matrix then

(a) $x = y$ (b) $x = 0$ (c) $y = 0$ (d) $x \neq y$

31. The sum of two skew matrices is
(a) symmetric matrix (b) null matrix
(c) skew-symmetric matrix (d) diagonal matrix

32. If A is symmetric matrix then A^n is
(a) symmetric matrix (b) null matrix
(c) skew-symmetric matrix (d) diagonal matrix

33. If A is any square matrix then both AA' and $A'A$ are
(a) symmetric matrix (b) null matrix
(c) skew-symmetric matrix (d) diagonal matrix

34. If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then A^5 is

(a) $5A$ (b) $10A$ (c) $16A$ (d) $32A$

35. If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then A^2 is

(a) $\begin{bmatrix} 4 & 0 & 1 \\ 4 & 1 & 9 \\ 1 & 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 1 & 2 \\ 9 & -2 & 5 \\ 0 & 1 & -2 \end{bmatrix}$

(c) $\begin{bmatrix} 5 & -1 & 2 \\ 9 & 2 & 5 \\ 0 & -1 & -2 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -1 & 2 \\ 9 & -2 & 5 \\ 0 & -1 & -2 \end{bmatrix}$

36. If A is a square matrix such that $A^2 = I$, then A^{-1} is
(a) $A + I$ (b) A (c) 0 (d) $2A$

37. If A and B are invertible matrices, which of the following is incorrect?
(a) $adj\ A = |A|A^{-1}$ (b) $det\ (A^{-1}) = (det\ A)^{-1}$
(c) $(A + B)^{-1} = A^{-1} + B^{-1}$ (d) $(AB)^{-1} = B^{-1}A^{-1}$

38. If A and B are two matrices such that $AB = A$ and $BA = B$, then B^2 is equal to
(a) A (b) B (c) 0 (d) I

39. The adjoint of a symmetric matrix is a
(a) symmetric matrix (b) null matrix
(c) skew-symmetric matrix (d) diagonal matrix

40. If $A = \begin{bmatrix} 1 & 2 & 6 \\ 4 & 5 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 8 \\ 3 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ then
(a) only AB is defined (b) only BA is defined
(c) both BA and AB are defined (d) both BA and AB are not defined

41. If $A = \frac{1}{\pi}\begin{bmatrix} \tan^{-1}(\pi x) & \cos^{-1}\left(\frac{x}{2\pi}\right) \\ \sin^{-1}\left(\frac{x}{2\pi}\right) & \sin^{-1}(\pi x) \end{bmatrix}$, $B = \frac{1}{\pi}\begin{bmatrix} -\cot^{-1}(\pi x) & \cos^{-1}\left(\frac{x}{2\pi}\right) \\ \sin^{-1}\left(\frac{x}{2\pi}\right) & -\cos^{-1}(\pi x) \end{bmatrix}$

then $A - B$ is
(a) I (b) 0 (c) $2I$ (d) $\frac{1}{2}I$

42. The matrix $A = \begin{bmatrix} 0 & 7 & -5 \\ 7 & 0 & 11 \\ 5 & -11 & 0 \end{bmatrix}$ is
(a) symmetric matrix (b) null matrix
(c) skew symmetric matrix (d) diagonal matrix

43. If A and B are square matrices of the dame order then $(A + B)$ $(A - B)$ is
(a) $A^2 - B^2$ (b) $A^2 - BA - AB - B^2$
(c) $A^2 + BA - AB - B^2$ (d) $A^2 - BA + B^2 + AB$

44. Use elementary column operation $C_2 \to C_2 + 2C_1$ in the following matrix equation $\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$, we have

(a) $\begin{bmatrix} 2 & 5 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ -1 & -1 \end{bmatrix}$

(c) $\begin{bmatrix} 2 & 5 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$

45. Choose the scalar matrix from the following options

(a) $A = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

46. If $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ satisfies $A'A = I$ then $x + y$ is

(a) 3 (b) 0 (c) −3 (d) I

47. If $A = [a_{ij}]$ is square matrix of order 3×3 such that $a_{ij} = i^2 - j^2$ then A is

(a) symmetric matrix (b) null matrix
(c) skew-symmetric matrix (d) diagonal matrix

Following questions from 48 to 54 are to be answered as per the exact requirement of the question :

48. If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ then AA' is.

49. If $M(\theta) = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, show that $M(x)M(y) = M(x + y)$.

50. Show that $A + A'$ is a skew-symmetric matrix if $A = \begin{bmatrix} 3 & 4 \\ 5 & 1 \end{bmatrix}$.

51. Construct $A_{2\times 2}$ matrix where $a_{ij} = |-2i + 3j|$.

52. If $A = [3\ \ 5]$, $B = [7\ \ 3]$ then find a non-zero matrix C such that $AC = BC$.

53. $A = \text{diag}[3\ \ -2\ \ 1]$ and $A = \text{diag}[1\ \ 3\ \ -2]$, find $2A - 3B$.

54. If the matrix $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew matrix, find the values of a, b and c.

Fill in the blanks in each of the following questions from 55 to 65 :

55. _____ matrix is both symmetric and skew-symmetric matrix.

56. If A and B are symmetric matrices of same order, then AB is symmetric if and only if _____.

57. If A is symmetric matrix, then A^3 is a _____ matrix.

58. A matrix which is not a square matrix is called a _____ matrix.

59. In applying one or more row operations while finding A^{-1} by elementary row operations, we obtain all zeros in one or more, then A^{-1} _____.

60. Matrix multiplication is _____.

61. Matrix addition is _____ and _____.

62. For addition of two matrices the _____ same.

63. Sum of two symmetric matrices is always a _____ matrix.

64. If A is skew-symmetric, then kA _____ (where k is a scalar).

65. Transpose of a column matrix is a _____ matrix.

ANSWERS

1. (a)	2. (b)	3. (d)	4. (a)	5. (a)	6. (c)
7. (b)	8. (c)	9. (a)	10. (b)	11. (a)	12. (a)
13. (a)	14. (a)	15. (a)	16. (d)	17. (c)	18. (c)
19. (d)	20. (a)	21. (a)	22. (a)	23. (a)	24. (c)
25. (d)	26. (d)	27. (d)	28. (a)	29. (a)	30. (a)
31. (c)	32. (a)	33. (a)	34. (c)	35. (d)	36. (b)
37. (c)	38. (b)	39. (a)	40. (a)	41. (d)	42. (c)
43. (c)	44. (a)	45. (d)	46. (c)	47. (c)	

48. $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$ 51. $\begin{bmatrix} 1 & 4 \\ -1 & 2 \end{bmatrix}$

52. $\begin{bmatrix} k \\ 2k \end{bmatrix}, \begin{bmatrix} k & k \\ 2k & 2k \end{bmatrix}$ etc., where k is a real number

53. $\text{diag}[3\ \ -13\ \ 8]$ 54. $a = -2, b = 0, c = -3$

55. Null matrix 56. $AB = BA$ 57. Symmetric matrix

58. Rectangular matrix 59. Does not exist 60. Associative

61. Commutative and associative 62. Order has to be

63. Symmetric matrix 64. Skew-symmetric matrix

65. Row matrix

PREVIOUS YEARS CBSE (XII) QUESTIONS

1. Construct a 2×2 matrix $A = [a_{ij}]$, whose elements are given by $a_{ij} = \frac{(i + j)^2}{2}$. *[2007]*

2. Find the values of x and y if $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$. *[2008]*

3. If matrix $A = [1 \quad 2 \quad 3]$, write AA', where A' is the transpose of A. [2009]

4. Find the value of x, if $\begin{pmatrix} 3x+y & -y \\ 2y-x & 3 \end{pmatrix} = \begin{pmatrix} 1 & 2 \\ -5 & 3 \end{pmatrix}$. [2009]

5. 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? [2010]

6. 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. [2010, 12]

7. If $\begin{pmatrix} a+b & 2 \\ 5 & b \end{pmatrix} = \begin{pmatrix} 6 & 5 \\ 2 & 2 \end{pmatrix}$, then find a. [2010 Compt. Type]

8. If A is a matrix of order 3×4 and B is a matrix of order 4×3, find the order of matrix (AB). [2010]

9. If $\begin{pmatrix} 2x+y & 3y \\ 0 & 4 \end{pmatrix} = \begin{pmatrix} 6 & 6 \\ 0 & 4 \end{pmatrix}$, then find x. [2010 Compt.]

10. If a matrix has 5 elements, write all possible orders it can have. [2011]

11. Find the value of $x + y$ from the following equation :
$$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$$ [2012]

12. Find the values of 'a' if $\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$. [2013]

13. 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? [2013]

14. If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$, then write the value of k. [2013]

15. 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 $(x - y)$. [2014]

16. Solve the matrix equation for x, $\begin{bmatrix} x & 1 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = 0$. [2014]

17. 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. [2014]

18. Write the element a_{23} of a 3×3 matrix $A = (a_{ij})$ whose elements a_{ij} are given by $a_{ij} = \frac{|i-j|}{2}$. [2015]

19. Use elementary column operation $C_2 \to C_2 + 2C_1$ in the following matrix equation :
$$\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 2 & 0 \end{bmatrix}\begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$$ [2016]

20. Write the number of all possible matrices of order 2×2 with each entry 1, 2 or 3. [2016]

21. If matrix $A = \begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$ is skew-symmetric, find the values of 'a' and 'b'. [2018]

22. Find the values of x and y from the following matrix equation :
$$2\begin{pmatrix} x & 5 \\ 7 & y-3 \end{pmatrix} + \begin{pmatrix} 3 & -4 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 7 & 6 \\ 15 & 14 \end{pmatrix}$$ [2017 Compt.]

23. If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & x \\ -2 & 2 & -1 \end{pmatrix}$ is a matrix satisfying $AA' = 9I$, find x. [2018 Compt.]

24. If A and B are symmetric matrices, such that AB and BA are both defined, then prove that $AB - BA$ is a skew-symmetric matrix. [2019]

25. For the matrix $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$, find $(A + A')$ and verify that it is a symmetric matrix. [2019]

26. A is a square matrix with $|A| = 4$. Then find the value of $|A \cdot (\text{adj } A)|$. [2019]

27. For what value of x is $\begin{bmatrix}1 & 2 & 1\end{bmatrix}\begin{bmatrix}1 & 2 & 0\\ 2 & 0 & 1\\ 1 & 0 & 2\end{bmatrix}\begin{bmatrix}0\\ 2\\ x\end{bmatrix} = 0$? *(2019 Compt.)*

ANSWERS

1. $\begin{bmatrix}2 & 9/2\\ 9/2 & 8\end{bmatrix}$ 2. $x=3, y=3$ 3. $[1\ \ 4]$ 4. $x=1$

5. $\alpha = 0°$ 6. $k=17$ 7. $a=4$ 8. 3×3

9. $x=2$ 10. 5×1 and 1×5 11. $x+y=11$

12. $a=1$ 13. $x=2$ 14. $k=2$ 15. 10

16. $x=2$ 17. $-I$ 18. $\frac{1}{2}$

19. $\begin{bmatrix}2 & 5\\ 2 & 4\end{bmatrix} = \begin{bmatrix}3 & 1\\ 2 & 0\end{bmatrix}\begin{bmatrix}1 & 2\\ -1 & -1\end{bmatrix}$ 20. 81 21. $a=-2$ and $b=3$

22. $x=2, y=9$ 23. $x=-2$ 25. $\begin{bmatrix}4 & 8\\ 8 & 14\end{bmatrix}$

26. 16 or 64 27. $x=-1$

4

Determinants

MULTIPLE CHOICE QUESTIONS (MCQs)

Choose the correct answer from the given four options in each of the following questions from 1 to 47 :

1. If $f(x) = \begin{vmatrix}0 & x-a & x-b\\ x+a & 0 & x-c\\ x+b & x+c & 0\end{vmatrix}$, then

(a) $f(a)=0$ (b) $f(b)=0$ (c) $f(0)=0$ (d) $f(1)=0$

2. If $A = \begin{bmatrix}2 & \lambda & -3\\ 0 & 2 & 5\\ 1 & 1 & 3\end{bmatrix}$, then A^{-1} exists if

(a) $\lambda = 2$ (b) $\lambda \neq 2$ (c) $\lambda \neq -2$ (d) none of these

3. The values of x for which $\begin{vmatrix}3 & x\\ x & 1\end{vmatrix} = \begin{vmatrix}3 & 2\\ 4 & 1\end{vmatrix}$ is

(a) $x = \mp 2\sqrt{2}$ (b) $x = -2\sqrt{2}$ (c) $x = 2\sqrt{2}$ (d) none of these

4. If $\Delta = \begin{vmatrix}a_{11} & a_{12} & a_{13}\\ a_{21} & a_{22} & a_{23}\\ a_{31} & a_{32} & a_{33}\end{vmatrix}$ and C_{ij} is co-factors of a_{ij}, then the value of Δ is given by

(a) $a_{11}C_{31} + a_{12}C_{32} + a_{13}C_{33}$ (b) $a_{11}C_{11} + a_{12}C_{21} + a_{13}C_{31}$

(c) $a_{21}C_{11} + a_{22}C_{12} + a_{23}C_{13}$ (d) $a_{11}C_{11} + a_{21}C_{21} + a_{31}C_{31}$

5. Value of $\begin{vmatrix}a & b & c\\ a+2x & b+2y & c+2z\\ x & y & z\end{vmatrix}$ is

(a) 0 (b) xyz (c) abc (d) none of these

6. A square matrix is invertible if and only if A is a

(a) null matrix (b) singular matrix

(c) non-singular (d) none of these

7. If $A = \begin{bmatrix} 1 & 2 & 4 \\ 5 & 7 & 8 \\ 9 & 10 & 12 \end{bmatrix}$, find the co-factors of elements of 7 and 12.

(a) –24 and –3 (b) 24 and –3 (c) –24 and 3 (d) none of these

8. If A is an invertible matrix of order 3 and $|A| = 5$, then find the value of $|adj\, A|$

(a) 25 (b) 5 (c) 125 (d) none of these

9. If A be square matrix of order 3, then the value of $|2A|$, where $|A| = 4$.

(a) 64 (b) 32 (c) 16 (d) none of these

10. If A is square matrix of order 3 such that $|adj\, A| = 64$, then $|A|$

(a) ∓ 8 (b) –8 (c) 8 (d) none of these

11. If A and B are non-singular matrices of same order, then AB and BA are also

(a) null matrices (b) singular matrices

(c) non-singular matrices (d) none of these

12. If $\cos 2x = 0$, then $\begin{vmatrix} 0 & \cos x & \sin x \\ \cos x & \sin x & 0 \\ \sin x & 0 & \cos x \end{vmatrix}^2$ is equal to

(a) $\frac{1}{2}$ (b) $\sin x$ (c) $\cos x$ (d) none of these

13. There are two values of x which makes, $\begin{vmatrix} 1 & -2 & 5 \\ 2 & x & -1 \\ 0 & 4 & 2x \end{vmatrix} = 86$, then sum of these values is

(a) 4 (b) 5 (c) –4 (d) 9

14. The maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin x & 1 \\ 1+\cos x & 1 & 1 \end{vmatrix}$ is (x is a real number)

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{2}}{3}$ (c) $\frac{1}{2\sqrt{2}}$ (d) none of these

15. Let A be square matrix of order 3×3, then $|kA|$ is equal to

(a) $k|A|$ (b) $k^2|A|$ (c) $k^3|A|$ (d) $3k|A|$

16. The number of distinct roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $\frac{-\pi}{4} \le x \le \frac{\pi}{4}$ is

(a) one (b) two (c) three (d) none of these

17. If A is an invertible matrix of order 2, then $det(A^{-1})$ is equal to

(a) $det(A)$ (b) $\frac{1}{det(A)}$ (c) 1 (d) 0

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

(a) $\begin{bmatrix} a^{-1} & 0 & 0 \\ 0 & b^{-1} & 0 \\ 0 & 0 & c^{-1} \end{bmatrix}$ (b) $\frac{1}{abc}\begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$

(c) $\frac{1}{abc}\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ (d) none of these

19. Let $A = \begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$, where $0 \le \theta \le 2\pi$. Then

(a) $det\,(A) = 0$ (b) $det\,(A) \in (2, \infty)$

(c) $det\,(A) \in (2, 4)$ (d) $det\,(A) \in [2, 4]$

20. If a, b, c are in A.P. then determinant $\begin{vmatrix} x+2 & x+3 & x+a \\ x+3 & x+4 & x+b \\ x+4 & x+5 & x+c \end{vmatrix}$ is

(a) 0 (b) 1 (c) x (d) $2x$

21. Let A be square matrix of order 3×3, $|A| \neq 0$ and $|kA| = k|A|$ then k is

(a) 0 (b) 3 (c) 9 (d) 27

22. Find x if $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & x \end{bmatrix}$ is a singular matrix

(a) 5 (b) 3 (c) 9 (d) 27

23. Find x if $A = \begin{bmatrix} \cos x & \sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is a singular matrix

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

24. Find λ if the system of equations $3x - 2y + z = 0$, $\lambda x - 14y + 1$ $= 0$, $x + 2y - 3z = 0$ has non-zero solution.

(a) $\lambda = 5$ (b) $\lambda = 0$ (c) $\lambda \neq 5$ (d) $\lambda \neq 0$

25. The value of determinant $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix}$ is equal to

(a) x (b) y (c) xy (d) x^2y^2

26. The system of equations $x + 2y + 3z = 7$, $2x - y - 5z - 13 =$ $-x + y - z - 11 = 0$ can be written as

(a) $\begin{bmatrix} x \\ y \\ z \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & -5 \\ -1 & 1 & -1 \end{bmatrix} = \begin{bmatrix} 7 \\ 13 \\ 11 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & -5 \\ -1 & 1 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7 \\ 13 \\ 11 \end{bmatrix}$

(c) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & -5 \\ -1 & 1 & -1 \end{bmatrix}\begin{bmatrix} 7 \\ 13 \\ 11 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & -5 \\ -1 & 1 & -1 \end{bmatrix} = \begin{bmatrix} x & y & z \end{bmatrix}\begin{bmatrix} 7 \\ 13 \\ 11 \end{bmatrix}$

27. If A and B are non-singular square matrices of the same order then $adj(AB)$ is

(a) AB (b) BA
(c) $(adj\ A)(adj\ B)$ (d) $(adj\ B)(adj\ A)$

28. If $A^2 - A + I = 0$ then the inverse of A is

(a) $A + I$ (b) $I - A$ (c) $A - I$ (d) $I + A$

29. If $A = \begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & k \end{bmatrix}$, then value of $|adj\ A|$ is

(a) k^{27} (b) k^9 (c) k^6 (d) none of these

30. If A is square matrix of order 3 such that $|A| = 3$, then the value of $|adj\ (adj\ A)|$

(a) 9 (b) 81 (c) 6 (d) 27

31. If A is square matrix of order 3 such that $|A| = 2$, then the value of $adj\ (adj\ A)$

(a) $2A$ (b) $3A$ (c) A (d) none of these

32. If A is square matrix of order 3 such that $adj\ (2A) = k\ (adj\ A)$, then the value of k is

(a) 2 (b) 1 (c) I (unit matrix) (d) 0

33. If A, B, C are invertible matrices, of the same order then $(ABC)^{-1}$ is

(a) $A^{-1}B^{-1}C^{-1}$ (b) ABC (c) $C^{-1}B^{-1}A^{-1}$ (d) I

34. If A is invertible square matrix then $adj\ (A^T)$ is

(a) A^T (b) A (c) $(adj\ A)^T$ (d) none of these

35. If $\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$, then the value of x is

(a) 0 and -12 (b) 0 and 12 (c) 12 and -12 (d) none of these

36. $\begin{vmatrix} x+9 & x & x \\ x & x+9 & x \\ x & x & x+9 \end{vmatrix}$ is equal to

(a) $243x$ (b) $243\ (x+9)$ (c) $243\ (x-9)$ (d) none of these

37. If $\Delta = \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$, $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ yz & zx & xy \\ x & y & z \end{vmatrix}$, then $\Delta - \Delta_1$ is equal to

(a) 0 (b) xyz (c) 1 (d) none of thes

38. If $\Delta = \begin{vmatrix} Ax & x^2 & 1 \\ By & y^2 & 1 \\ Cz & z^2 & 1 \end{vmatrix}$, $\Delta_1 = \begin{vmatrix} A & B & C \\ x & y & z \\ xy & zx & xy \end{vmatrix}$, then $\Delta - \Delta_1$ is equal to

(a) xyz (b) $x + y + x$ (c) 0 (d) none of thes

39. $\begin{vmatrix} (a+1)(a+2) & (a+2) & 1 \\ (a+2)(a+3) & (a+3) & 1 \\ (a+3)(a+4) & (a+4) & 1 \end{vmatrix} =$ ———.

(a) 2 (b) ∓ 2 (c) -2 (d) none of thes

40. Write the value of $\Delta = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$.

(a) 0 (b) xyz (c) 3 (d) none of thes

41. Write the value of $\Delta = \begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$

(a) a^3 (b) b^3 (c) abc (d) none of thes

42. Solve for x : $\begin{vmatrix} x+a & b & c \\ c & x+b & a \\ a & b & x+c \end{vmatrix} = 0$ where $x \neq 0$

(a) $x = (a+b+c)$ (b) $x = -(a+b+c)$
(c) $x = -abc$ (d) none of these

43. Solve for x : $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -x-6 \end{vmatrix} = 0$

(a) $x = 0, \mp 9$ (b) $x = 0, 9$ (c) $x = 0, -9$ (d) none of thes

44. Write the value of $\Delta = \begin{vmatrix} x+k & x & x \\ x & x+k & x \\ x & x & x+k \end{vmatrix}$

(a) $\Delta = k^3$ (b) $\Delta = k^2(3x-k)$
(c) $\Delta = k^2(3x+k)$ (d) none of these

45. Solve for x : $\begin{vmatrix} x-1 & 1 & 1 \\ 1 & x-1 & 1 \\ 1 & 1 & x-1 \end{vmatrix} = 0$

(a) $x = -1, 2, 2$ (b) $x = -1, 2, -2$
(c) $x = -1, -2, -2$ (d) none of these

46. Write the value of $\Delta = \begin{vmatrix} \sin\alpha & \cos\alpha & \cos(\alpha+\delta) \\ \sin\beta & \cos\beta & \cos(\beta+\delta) \\ \sin\gamma & \cos\gamma & \cos(\gamma+\delta) \end{vmatrix}$.

(a) $\Delta = \sin\alpha$ (b) $\Delta = \cos\beta$
(c) $\Delta = 0$ (d) none of these

47. Write the value of $\Delta = \begin{vmatrix} 1 & bc & bc(b+c) \\ 1 & ca & ca(c+a) \\ 1 & ab & ab(a+b) \end{vmatrix}$

(a) $\Delta = 0$ (b) $\Delta = abc$
(c) $\Delta = ab + bc + ca$ (d) none of these

Following questions from 48 to 55 are to be answered as per the exact requirement of the question:

48. Without expanding prove that : $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} = \begin{vmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ 1 & 0 & -1 \end{vmatrix}$

49. Without expanding prove that : $\begin{vmatrix} a^2 & a & bc \\ b^2 & b & ca \\ c^2 & c & ab \end{vmatrix} = -\begin{vmatrix} 1 & 1 & 1 \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}$

50. Show that points $(b, c+a)$, $(c, a+b)$ and $(a, b+c)$ are collinear.

51. If (x, y), $(a, 0)$, $(0, b)$ are collinear, then using determinants prove that $\frac{x}{a} + \frac{y}{b} = 1$.

52. Without expanding prove that : $\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix} = 0$

53. Find the equation of a line joining A (1, 3) and B (0, 0) using determinants and find k if C (k, 0) is point such that area of triangle ABC is 3 sq. units.

54. Find k so that the equations $3x - 2y + 2z = 1$, $2x + y + 3z = 2$, $x - 3y + kz = 0$ may have a unique solution.

55. For what value of k, do the equations $4x - 5y - 2z = 2$, $5x - 4y + 2z = -2$, $2x + 2y + kz = -1$ have no solution.

Fill in the blanks in each of the following questions from 56 to 64 :

56. If in the system of linear equations $AX = B$, $B = 0$ and $|A| \neq 0$ then $x = 0, y = 0$ and $z = 0$ is called as _____ solution.

57. If in the system of linear equations $AX = B$, $|A| \neq 0$ and $(adj\ A)\ B = O$ then equation are called as _____.

58. If A is square matrix of order 3×3, then $|3A|$ is _____.

59. If A is invertible matrix of order 3×3, then $|A^{-1}|$ is _____.

60. If A is matrix of order 3×3, then the number of minors in determinant of A are _____.

61. The sum of the products of elements of any row with the co-factors of corresponding elements is equal to _____.

62. If A and B are matrices of order 3 and $|A| = 5$, $|B| = 3$, then $|3AB|$ is equal to _____.

63. For a square matrix A in matrix equation $AX = B$, if $|A| = 0$ and $(adj\ A)\ B \neq O$ then there exists _____.

64. If A is a square matrix of order n, then $|adj\ A|$ is equal to _____

ANSWERS

1. (c)	2. (d)	3. (a)	4. (d)	5. (a)	6. (c)
7. (a)	8. (a)	9. (b)	10. (a)	11. (c)	12. (a)
13. (c)	14. (a)	15. (c)	16. (a)	17. (b)	18. (a)
19. (d)	20. (a)	21. (d)	22. (b)	23. (b)	24. (a)
25. (c)	26. (b)	27. (d)	28. (b)	29. (c)	

30. (b) as $|adj\ (adj\ A)| = |A|^{(n-1)^2}$ 31. (a) as $adj\ (adj\ A) = |A|^{n-2}A$

32. (a)	33. (c)	34. (c)	35. (a)	36. (b)	37. (a)
38. (c)	39. (c)	40. (a)	41. (a)	42. (b)	43. (a)

44. (c)	45. (a)	46. (c)	47. (a)	53. $y = 3x$ and $k = \pm 3$
54. $k \neq -1$	55. $k = 8$	56. Trivial solution		57. Dependent

58. $27\ |A|$ 59. $\frac{1}{|A|}$ 60. 9 61. Zero 62. 405

63. no solution 64. $|A|^{n-1}$

PREVIOUS YEARS CBSE (XII) QUESTIONS

1. Find the area of triangle whose vertices are (2, 7), (1, 1) and (10, 8). *[2007]*

2. Without expanding, show that $\begin{vmatrix} \sin\alpha & \cos\alpha & \cos(\alpha+\delta) \\ \sin\beta & \cos\beta & \cos(\beta+\delta) \\ \sin\gamma & \cos\gamma & \cos(\gamma+\delta) \end{vmatrix} = 0.$ *[2007]*

3. Using the properties of determinants, prove that

$$\begin{vmatrix} x-3 & x-4 & x-\alpha \\ x-2 & x-3 & x-\beta \\ x-1 & x-2 & x-\gamma \end{vmatrix} = 0, \text{ (where } \alpha, \beta, \gamma \text{ are in A.P.)} \quad \textit{[2007]}$$

4. Evaluate $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$. *[2008]*

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

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}. \quad \textit{[2008]}$$

6. For what value of x, is the following matrix singular?

$$\begin{bmatrix} 3-2x & x+1 \\ 2 & 4 \end{bmatrix} \quad \textit{[2008, 2011 type]}$$

7. Evaluate $\begin{vmatrix} \sin 30° & \cos 30° \\ -\sin 60° & \cos 60° \end{vmatrix}$. *[2008]*

8. A matrix A of order 3×3 has determinant 4. Find the value of $|3A|$. *[2008, 2012 Compt. type]*

9. Write the value of determinant $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$. [2009

10. Write the value of determinant $\begin{vmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{vmatrix}$. [2009

11. If A is an invertible matrix of order 3 and $|A| = 5$, then find $|adj\ A|$. [2009, 2011 Compt.

12. Find the minor of the element of second row and third colum (a_{23}) in the following determinant

$$\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$$ [2010, 2012 type

13. If A is a square matrix of order 3 and $|3A| = k|A|$, then write th value of k. [2010

14. What positive value of x makes the following pair of determinant equal?

$$\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix}, \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}$$ [2010, 2013 type, 2014 type

15. A is a square matrix of order 3 and $|A| = 7$. Write the value of $|adj\ A|$. [2010

16. If $A = \begin{bmatrix} 3 & 1 \\ 2 & -3 \end{bmatrix}$, then find $|adj\ A|$. [2010 Compt.

17. If $|A| = 2$, where A is a 2×2 matrix, find $|adj\ A|$. [2010 Compt.

18. Evaluate $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$. [2011

19. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, write A^{-1} in terms of A. [2011

20. A matrix A of order 3×3 is such that $|A| = 4$. Find the value o $|2A|$. [2011 Compt., 2012

21. If $A = \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$, find the value of $3|A|$. [2011 Compt.

22. 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? [2013]

23. If A is a square matrix of order 3 such that $|adj\ A| = 64$, find $|A|$. [2013 Compt.]

24. If $A = \begin{bmatrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{bmatrix}$, then write the co-factor of a_{21} of its 2nd row. [2015]

25. Write the value of $\Delta = \begin{vmatrix} x+y & y+z & x+z \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$ [2015]

26. If $A = \begin{vmatrix} x+3 & -2 \\ -3x & 2x \end{vmatrix} = 8$, then find the value of x. [2016]

27. Given $A = \begin{pmatrix} 4 & 2 & 5 \\ 2 & 0 & 3 \\ -1 & 1 & 0 \end{pmatrix}$, write the value of $det(2A\ A^{-1})$. [2016 Compt.]

28. If A is a square matrix of order 2 and $|adj\ A| = 9$, find $|A|$. [2016 Compt.]

29. If for any 2×2 square matrix, $A(adj\ A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$ then write the value of $|A|$. [2017]

30. Given $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$, compute A^{-1} and show that $2A^{-1} = 9I - A$. [2018]

31. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $A^{-1} = kA$, then find the value of k. [2018 Compt.]

32. Find the co-factor of the element a_{23} of the determinant $\begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$. [2019 Compt.]

33. If $A = \begin{bmatrix} 5 & -3 \\ -3 & 2 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 3 & 2 \\ 0 & -1 \end{bmatrix}$, find A^{-1} and hence fi [2019 Compt

$(AB)^{-1}$.

34. If A is a square matrix of order 3, with $|A| = 9$, then write the va [201 of $|2 \cdot adj\, A|$.

ANSWERS

1. 23.5 sq. units		4. $a^2+b^2+c^2+d^2$	5. 46		6. 1
7. 1	8. 108	9. 0	10. 0	11. 25	12. 13
13. 27	14. ± 4	15. 49	16. -11	17. 2	18. 0
19. $\frac{1}{19}\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix} = \frac{1}{19}A$		20. 4	21. 6	22. 2	23. ± 8
24. 3	25. 0	26. 2	27. 8	28. $\|A\| = 9$	29. 8
30. $A^{-1} = \frac{1}{2}\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$		31. $k = \frac{1}{19}$	32. -7	33. $\begin{bmatrix} 12 & 19 \\ -3 & -5 \end{bmatrix}$	34. 64

Class-XII

Subject-English

Q1.You are the students' Union Advisor of Shri krishan Senior Secondary School,Ujjain.Write an Election-Notice inviting nominations for the posts of President,Vice-President,Secretaryand Treasurer of Union.

Q2.Prepare a poster on kindness to animals to be displayed in the city at public places appealing to the public to show kindness to animals.

Q3.You have a degree in architecture and have worked for a British firm for five years .Write an application for the post of Senior Architect in Atul Constructions 15,Gurugram.you are Mridul/Mridula,a resident of 56,Cross street,New Delhi.Prepare a Bio-data to be enclosed.

Q4.Should You Be Worried About the Coronavirus ? Is it a cause for caution and not for alarm ? Express your views.[150-200 words]

Q5. Read Lesson-'Journey To The End of the Earth' by Tishani Doshi in the book-Vistas and write down all the textual questions & their answers in your fair note-book.

ग्रीष्मावकाश गृहकार्य (हिंदी)

कक्षा – XII

1–कक्षा में करवाया गया समस्त कार्य याद करना है |

- 2–* परियोजना बनाने के लिए आपके नाम तथा विषय नीचे सूची में दिए गए हैं | आप अपने नाम तथा विषय के अनुसार ग्रीष्मावकाश में तैयार करना है |

हिंदी परियोजना सूची

कक्षा – XII

S.NO.	छात्र का नाम विज्ञान वर्ग	छात्र का नाम वाणिज्य वर्ग	छात्र का नाम मानविकी वर्ग	परियोजना विषय
1	Ankita	Aman Pundir	Bhumika Longani	कबीर दास
2	Ashu Pal	Ayush Garg	Garima kapil	तुलसीदास
3	Mohd. Asjad	Shivank Bindal	Nancy khatanaa	हरिवंशराय बच्चन
4	Atul Saini	Yashvi Saini	Prakarti	जनसंचार माध्यम
5	Harsh Sharma		Swati Rana	मीरा बाई
6	Mohd. Zaid		Tanisha Malik	विज्ञापन की दुनिया
7	Nitish Kumar		Vansh Bhaskar	वैश्विक महामारी 'कोरोना'
8	Rachit Bansal		Abhinav Panwar	देश की जीवन रेखाएँ ' हमारी नदियाँ'
9	Pratham		Alina	लतामंगेशकर

10	**Tanu Nirala**		**Khushi**	मोबाइल आज की आधारभूत आवश्यकता
11	**Vedika**		**Nishant**	महादेवी वर्मा
12	**Swati Sharma**		**Priyanka Singh**	पत्रकारिता के विभिन्न आयाम
13	**Harsh Chy.**		**Rajat**	रामचरितमानस
14			**Shreya Gupta**	हिंदी काव्य का इतिहास
15			**Srishti Vats**	हिंदी गद्य साहित्य का इतिहास
16			**Vivek Sharma**	कबीरदास
17			**Khushi Pundir**	मालिक मुहम्मद 'जायसी'

नोट :- परियोजना बनाने के लिए शब्द सीमा 1000शब्द है। सम्बन्धित तस्वीर भी चिपकानी है ।

CLASS XII

INFORMATION PRATICES

1. Create a student table with the student id, name, and marks as attributes where the student id is the primary key.
2. Insert the details of a new student in the above table.
3. Delete the details of a particular student in the above table.
4. Use the select command to get the details of the students with marks more than 80.
5. Create a new table (order ID, customer Name, and order Date) by joining two tables (order ID, customer ID, and order Date) and (customer ID, customer Name, contact Name, country).
6. Create a foreign key in one of the two tables mentioned above
7. Find the min, max, sum, and average of the marks in a student marks table.
8. Find the total number of customers from each country in the table (customer ID, customer Name, country) using group by.
9. Create a new table (name, date of birth) by joining two tables (student id, name) and (student id, date of birth).
10. Write a SQL query to order the (student ID, marks) table in descending order of the marks.

PHYSICAL EDUCATION CLASS-XII

HOLIDAY WORK

1. Discuss the objective of planning in sports.
2. What are the lifestyle disease? How can we prevent them?
3. What is Hypertension? Discuss the benefits and contradictions of Vajrasana and Ardhachakrasana.
4. Explain any three asanas, which are beneficial in preventing as well as curing asthma.
5. Explain the causes of any postural deformities in detail.
6. Write short note on any two of the following indicating the causes and remedial measures, flatfoot, knee knock and bow leg.
7. Write short note ADHD, ODD and OCD.
8. What is a physical disability?
9. What are the benefits of physical activity for children with special need?
10. What do you mean by congenital deformity?