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

ASSIGNMENT CLASS XII COMMERCE

ACCOUNTANCY

Holiday Assignment

Class XII

Q1.Under what heads will you classify the followings:

1) Proposed Dividends
2) Interest Accrued and due on secured loans
3) Interest Accrued and due on unsecured Loans
4) Provision for Taxation
5) Arrears of fixed accumulative dividends
6) Security premium Account
7) Share Forfeiture account.

Q2. Under what headings will you show the following items in the Balance sheet of a company

1) Securities Premium account
2) Preliminary Expenses
3) Bills Receivable
4) Goodwill
5) Authorised share Capital

Q3. Prepare a Comparative Income statement with the help of the following information

Particulars	**2015**	**2016**
RFO	2000000	3000000
Gross Profit	40%	30%
Indirect Expenses (on RFO)	50%	40%
Income Tax	50%	50%

Q4.(a) The ratio of current Assets (Rs. 600000) to current Liabilities (Rs. 400000) is 1.5:1.The Accountant of the firm is interested in maintaining a current Ratio be 2:1 by paying off a part of Liabilities. Calculate the amount of Current Liabilities that should be paid.

(b) The Current Assets to Current Liability of a firm is Rs. 800000 to Rs. 300000. The Accountant of the firm wishes that current Ratio be 2:1 by acquiring current assets on credit. Calculate the amount of current Assets.

Q5. (a) A business has current Ratio of 4:1 & a Quick Ratio of 1.2:1 . If working capital is Rs. 180000. Calculate total current Assets and Inventory.

(b) Calculate current Ratio and Quick Ratio from the followings:

Working capital Rs. 150000, Total Debts Rs.400000, Long term debts Rs. 310000, Inventory Rs. 110000, Prepaid Expenses Rs. 10000

Q6. (a) Calculate current Ratio and Quick Ratio from the following information:

Total Assets	Rs. 350000
Fixed Assets	Rs. 180000
Investment	Rs. 70000
Share holders fund	Rs. 200000
Long term Debts	Rs. 100000
Inventory	Rs. 45000

(b) From the following information calculate the Inventory turnover ratio.
Sales Rs. 200000, G.P 25% on cost, Opening Inventory was 1/3rd of the value of closing Inventory, Closing Inventory was 30% of sales.

Q7. (a)Determine the amount of gross profit and sales from the followings:

Trade Receivable Turnover Ratio = 4 Times
Cost of goods sold = Rs. 640000
Gross Profit Ratio = 20%

Closing Debtors were Rs. 20000 more than at the beginning.

Cash sales being 33 1/3 % of credit sales.

Q8. (a)If Current Ratio is 2:1 state giving reason of the following transaction would

(i) Improve (ii) Reduce or (iii) Not change Current Ratio
(1) Bills Receivable drawn
(2) Bills Receivable Dishonoured
(3) Bills Receivable endorsed to Creditors
(4) Sales of Goods for cash at par
(5) Sales of Goods for cash at Profit
(6) Sales of Assets for Cash
(7) Bills Payable given to creditors

(b) If the Liquid ratio is 1:1, find whether the following transactions would
(i) Improve (ii) Reduce or (iii) Not change Liquid Ratio
1) Purchase of goods for cash
2) Purchase of goods on credit
3) Payment of Tax Provision
4) Sales of short term investment at par
5) Sales of Investment at profit

Q9.(a) Calculate Closing inventories from the following information:-

Total RFO Rs 600000
Gross Profit 25%
Inventories Turnover Ratio = 5 times
Closing inventories is Rs. 12000 more than opening inventories

(b) Gross Profit Ratio of a company was 25%. Its cash sales were Rs. 200000 and its credit Sales was 90% of the total sales. If the indirect expenses of the Company were Rs. 20000. Calculate net Profit ratio.

Q10. With the help of the following information. Prepare Comparative Income Statement of XYZ Ltd.

	2017	2018
RFO	50000	80000
Cost of RFO	60% of RFO	70% of RFO
Indirect Expenses	10% of Gross profit	
Rate of Income Tax	50% of Net profit before tax	

Q11. Calculate Return on Investment from the following

Gross Profit Rs.100000, Office Expenses Rs. 10000, Selling and Distribution expenses Rs. 25000, Interest on Bank Loan Rs. 8000, Income tax Rs. 12000, Fixed Assets Rs. 300000, Current Assets Rs. 150000 & Current Liabilities Rs. 125000

Q12.The Debt-equity ratio of a company is 1:2, state giving reasons which of the following would improve, reduce or no change the ratio:-

1) Debenture redeemed for cash
2) Issue new equity shares
3) Payment of Proposed dividends
4) Goods Purchased on Credit
5) Goods Purchased on Cash
6) Redemption of Debentures against the Purchase of a Fixed Assets

CASH FLOW STATEMENT

1. Arvind, an industrialist purchased a machinery worth Rs.5 crores on hire purchase basis. Categories the (i) payment of installment and (ii) interest into operating/investing or financing activity as per cash flow statement.

2. Give two examples of movements of cash and cash equivalents, which are not recorded in the Cash Flow Statement.

3. Give one example each of an extra ordinary item under operating, investing and financing activity.

4. M/s.Lakshmi Electrical Appliances furnish the following information -

Calculate net cash flow from financing activities:-

Particulars	*31.12.2007*	*31.12.2008*
Equity share capital	2,00,000	4,50,000
10% debentures	1,00,000	-
6% preference shares	-	3,00,000

Additional information –

(a) Interest paid on debentures Rs.5,000/-.
(b) Dividend paid on equity shares Rs.40,000/-.
(c) Bonus shares were issued to existing shareholders in the ratio of 4:1 during the year.

5. P.Ltd. purchased a business premises for Rs.6,60,000 from Z.Ltd. Half the payment was made in cash and the remaining half by issue of equity shares of Rs.100 each at a premium of 10% in favour of Z.Ltd. How will this transaction be shown in the cash flow statement.

6. From the following information, calculate cash flow from investing and financing activities:-

Particulars	*Opening*	*Closing*
Furniture (cost)	2,00,000	2,80,000
Accumulated depreciation on furniture	60,000	90,000
Share Capital	10,00,000	4,00,000
Loan from bank	2,50,000	1,50,000

During the year, furniture costing Rs.40,000 was sold at a profit of Rs.30,000. Depreciation charged on furniture amounted to Rs.50,000.

7. A company had the following balance -

Particulars	*Rs.*
Investment at the beginning of the period	3,40,000
Investment at the end of the period	2,80,000

During the year, the company sold 40% of investments at the beginning at a profit of 84,000. Calculate cash flow from investing activities.

8. Apoorv Ltd. incurred as loss of Rs.7000 during the year 2018-19.

The following is the position of current assets and current liabilities of the firm:-

Particulars	*2018*	*2019*
Pre-paid insurance	5,000	8,000
Commission received in advance	2,000	3,000
Stock	10,000	15,000
B/P	15,000	18,000

Calculate cash flow from operating activities.

9. Prepare cash flow statement from following information.

Opening cash balance Rs.15,000, closing cash balance Rs.19,000. Increase in creditors Rs.13,000, decrease in debtors Rs.17,000. Fixed assets purchased Rs.30,000. Redemption of 12% debentures Rs.14,000. Profit during the year 18,000.

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BUSINESS STUDIES

Holiday Assignment

Class XII

Make a project file on the basis of Fayol's principles of mgmt.that how these principles applies in real business.students can take help from net.

ECONOMICS

Holiday Assignment

Class XII

Prepare a project for board on any one topic

Rural Development

Poverty

Unemployment

Education Sector

Health Sector

Economic Reforms 1991

Enviornmental Problem

Or

any relevant topic

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

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

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 $x\mathcal{R}y$ 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 $a\mathcal{R}b$ 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 $x\mathcal{R}y \Leftrightarrow x^2 - 4xy + 3y^2 = 0 \forall x, y \in N$. 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) $3x^3$ (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?