APPLIED MATHEMATICS (SET-1)

Chapters (1. Numbers, Quantifications and Numerical Applications, 2. Differentiation and its Applications)

1. Numbers, Quantifications and Numerical Applications

1. (8 x 14) in 12 hours clock is

(a) 4 O'clock (b) 8 O'clock (c) 6 O'clock (d) 2 O'clock

2. (09:30+16: 40) in 24 hours clock is

(a) 03:10 (b) 26:10 (c) 2:10 (d) 25:70

3. If x= 4 (mod 7), then positive values of x are

(a) (4, 11, 18,.. (b) (11, 18, 25,... (c) (4, 8, 12,...) (d) (1, 8, 15, ...)

4. σ(15) is equal to

(a) 8 (b)24 (c)4 (d) 16

5.ω (32) is equal to

(a) 1 (b) 3 (c)5 (d) 7

6. Three types of wheat costing ₹18 per kg, ₹ 20 per kg and ₹25 per kg are mixed together. If the mixed variety is sold at ₹ 22 per kg, then the ratio in which these types of wheat should be mixed respectively is

(a) 1:2:3 (b) 2:2:3 (c) 2:3:1 (d) 1:1:2

7. In what ratio must a grocer mix two varieties of pulses costing ₹85 per kg and ₹100 per kg respectively so as to get a mixture worth Rs 92 per kg?

(a) 7:8 (b) 8:7 (c) 5:7 (d) 7:5

8. In what ratio must water be mixed with milk to gain $16\frac{2}{3}$% on selling the mixture at cost price?

(a) 1:6 (b) 6:1 (c) 3:2 (d) 2:3

9. Milk and water in two vessels A and B are in the ratio 5:3 and 5:4 respectively. In what ratio. the liquid of both the vessels be mixed to obtain a new mixture in which ratio of milk and water is 7:5 respectively?

(a) 3:2 (b) 3:5 (c) 2:3 (d) 2:5

10. A boy's speed with the current is 15 km/h and the speed of the current is 2.5 km/h. The boy's speed against the current is

(a) 8.5 km/h (b) 9 km/h (c) 10 km/h (d) 12.5 km/h

11. A boat running downstream covers a distance of 16 km in 2 hours while for covering the same distance upstream it takes 4 hours. What is the speed of the boat in still water?

(a) 4 km/h (b) 6 km/h (c) 8 km/h (d) 10 km/h

12. The speed of a boat in still water is 15 km/h and the rate of current is 3 km/h. The distance travelled by boat downstream in 12 minutes is

(a) 1.2 km (b) 1.8 km. (c) 2.4 km (d) 3.6 km

13. A and B invest₹ 50000 and ₹45000 respectively in a business. After 9 months B withdrew his investment. At the end of a year they earned a profit of ₹ 13400. What was B's share of profit?

(a) ₹5400 (b) ₹ 3 9045 (c) ₹ 4500 (d) ₹ 5990

14. Nisha started a business with 540000. After few months Kusum joined her with an investment of Rs720000. If at the end of a year they shared the profit equally, then find after how many months Kusum joined Nisha?

(a) 3 (b) 6 (c) 9 (d) 10

15. A, B and C started a business by investing money in the ratio 5: 7: 9. After 4 months D joined them by investing money equal to the investment of B. Find the ratio of their profits at the end of a year.

(a) 15:17:28:25 (b) 15:21:27:14 (c) 12:15:17:9 (d) 12:17:19:13

CASE STUDY

For completing a particular type of embroidery work, 2 women and 5 men take 4 days. Also, the same work was completed in 3 days by 3 women and 6 men.

Based on the above information, answer the following questions:

16. How much time was taken by 1 woman alone to finish the work?

(a) 15 days (b) 17 days (c) 18 days (d) 20 days

17. How much time was taken by 1 man alone to finish the work?

(a) 35 days (b) 36 days (c) 37 days (d) 38 days

18. In how many days will 2 women complete the same work?

(a) 8 days (b) 9 days (c) 10 days (d) 11 days

19. If the work is completed in 12 days, then find the number of men employed for the same.

(a) 3 men (b) 4 men (c) 5 men (d) 2 men

20. Find the ratio of efficiency of 1 woman to that of 1 man.

(a) 1:2 (b) 2:1) (c) 2:3 (d) 3:2

2. Differentiation and its Applications.

1	Given that $x = at^2$ and $y = 2at$, then value of $\frac{d^2y}{dx^2}$ is (a) $-\frac{1}{2at^3}$ (b) $-\frac{1}{2at^2}$ (c) $\frac{1}{t^2}$ (d) $\frac{-2a}{t}$
2	If $e^x + e^y = e^{x+y}$, then $\frac{dy}{dx}$ is: a) e^{y-x} b) e^{x+y} c) $-e^{y-x}$ d) $2e^{x-y}$
3	If x$\sqrt{1+y}$ + y$\sqrt{1+x}$ = 0, The value of (1 + x^2) $\frac{dy}{dx}$ is equal to: a. 0 b. 1 c. -1 d. 2
4	Find dy/dx ; if y = t log t and x = (log t) a. t b. 1/t c. (1+ log t)/t d. (1+ log t)t
5	For what values of x is the rate of increase of total cost function C(x) = x^3 - 5x^2 +5x +8 is twice the rate of increase of x? a. 3 b. 1 , 3 c. 1/3 d. 3, 1/3
6	If y = log (x + $\sqrt{a^2 + x^2}$) , Then the value of ($a^2 + x^2)y_2$+ xy_1 is: a. 0 b. 1 c. x d. -1

7	The point at which the normal to the curve y = $x + \frac{1}{x}$, x > 0 is perpendicular to the line 3x – 4y – 7 = 0 is: a) (2, 5/2) b) (±2, 5/2) c) (- 1/2, 5/2) d) (1/2, 5/2)		
8	The points on the curve $\frac{x^2}{9} + \frac{y^2}{16} = 1$ at which the tangents are parallel to y-axis are: a) $(0, \pm 4)$ b) (±4,0) c) $(\pm 3, 0)$ d) $(0, \pm 3)$		
9	The point(s) on the curve y = x^3 – 11x + 5 at which the tangent is y = x – 11 is/are: a) (-2,19) b) (2, - 9) c) $(\pm 2, 19)$ d) (-2, 19) and (2, -9)		
10	For which value of m is the line y = mx + 1 a tangent to the curve y^2 = 4x? a) $\frac{1}{2}$ b) 1 c) 2 d) 3		
11	The equation of tangent to the curve $y = x^3 + x$ at the point (1, 2) is (a) $4x + y = 6$ (b) $4x - y = 2$ (c) $4x - y = 12$ (d) $4x + 3y = 7$		
12	The intervals in which the function f given by f (x) = x^2 – 4x + 6 is strictly increasing a) (– ∞, 2) ∪ (2, ∞) b) (2, ∞) c) $(-\infty, 2)$ d) (– ∞, 2]∪ (2, ∞)		
13	The real function f(x) = $2x^3 - 3x^2 - 36x + 7$ is: a) Strictly increasing in $(-\infty, -2)$ and strictly decreasing in $(-2, \infty)$ b) Strictly decreasing in $(-2, 3)$ c) Strictly decreasing in $(-\infty, 3)$ and strictly increasing in $(3, \infty)$ d) Strictly decreasing in $(-\infty, -2) \cup (3, \infty)$		
14	The value of b for which the function $f(x) = x + cosx + b$ is strictly decreasing over **R** is: a) $b < 1$ b) No value of b exists c) $b \leq 1$ d) $b \geq 1$		

15 The function $y = \frac{1}{x}$ is strictly decreasing in the interval(s)

(a) $(0, \infty)$ only (b) $(-\infty, 0)$ only (c) $(-\infty, 0)$ as well as $(0, \infty)$ (d) **R**

16 The total cost function is given by $C(x) = x^2 + 30x + 1500$. The marginal cost when 10 units are produced is:

(a) ₹ 20 (b) ₹ 30 (c) ₹ 50 (d) ₹ 70

17 The demand function of a toy is, $x = 75 - 3p$ and its total cost function is $TC = 100 + 3x$. For maximum profit the value of x is

(a) 33 (b) 31 (c) 29 (d) 24

18 The variable cost of producing x units is $V(x) = x^2 + 2x$. If the company incurs a fixed cost of ₹10,000, then the level of output where the average cost is minimum is

(a) 10 units (b) 50 units (c) 100 units (d) 200 units

19 The least value of the function $f(x) = 2cosx + x$ in the closed interval $[0, \frac{\pi}{2}]$ is:

a) 2	b) $\frac{\pi}{6} + \sqrt{3}$
c) $\frac{\pi}{2}$	d) The least value does not exist.

20 The area of a trapezium is defined by function f and given by $f(x) = (10 + x)\sqrt{100 - x^2}$, then the area when it is maximised is:

a) $75cm^2$	b) $7\sqrt{3}cm^2$
c) $75\sqrt{3}cm^2$	d) $5cm^2$

CASE STUDY

The fuel cost per hour for running a train is proportional to the square of the speed it generates in km per hour. If the fuel costs ₹ 48 per hour at speed 16 km per hour and the fixed charges to run the train amount to ₹ 1200 per hour.

Assume the speed of the train as v km/h.

Based on the given information, answer the following questions.

21 Given that the fuel cost per hour is k times the square of the speed the train generates in km/h, the value of k is:

a) $\frac{16}{3}$	b) $\frac{1}{3}$
c) 3	d) $\frac{3}{16}$

22	If the train has travelled a distance of 500km, then the total cost of running the train is given by function: a) $\frac{15}{16}v + \frac{600000}{v}$ b) $\frac{375}{4}v + \frac{600000}{v}$ c) $\frac{5}{16}v^2 + \frac{150000}{v}$ d) $\frac{3}{16}v + \frac{6000}{v}$		
23	The most economical speed to run the train is: a) 18km/h b) 5km/h c) 80km/h d) 40km/h		
24	The fuel cost for the train to travel 500km at the most economical speed is: a) ₹ 3750 b) ₹ 750 c) ₹ 7500 d) ₹ 75000		
25	The total cost of the train to travel 500km at the most economical speed is: a) ₹ 3750 b) ₹ 75000 c) ₹ 7500 d) ₹ 15000		

	APPLIED MATHEMATICS :SET-2		
	Algebra (Matrix) 25 Questions		
1	If $A=\begin{bmatrix}3 & 4\\ 2 & 3\end{bmatrix}$, $B=\begin{bmatrix}-2 & -2\\ 0 & -1\end{bmatrix}$ then $(A+B)^{-1}$ is: A $\begin{bmatrix}-1 & 1\\ 1 & -1/2\end{bmatrix}$ B does not exist C is a skew-symmetric D None of these		
2	In a 3×3 matrix A, value of $a_{12}c_{13} + a_{22}c_{23} + a_{32}c_{33}$, where c_{ij} is the cofactor of a_{ij} is (a) 0 (b) -1 (c) 1 (d) $\lvert A \rvert$		
3	If A is a square matrix of order 3 and $\lvert A \rvert = -2$, then $\lvert adj(A) \rvert$ is equal to (a) -8 (b) -2 (c) 0 (d) 4		
4	If two square matrices A and B are such that $\lvert AB \rvert = 12$ and $\lvert B \rvert = -4$, then value of $\lvert A \rvert$ is: (a) 8 (b) -8 (c) -3 (d)16		
5	Value of k, for which A = $\begin{bmatrix}k & 8\\ 4 & 2k\end{bmatrix}$ is a singular matrix is: a) 4 b) -4 c) ±4 d) 0		
6	Given that A is a square matrix of order 3 and | A | = - 4, then | adj A | is equal to: a) -4 b) 4 c) -16 d) 16		
7	If $\begin{bmatrix}2a+b & a-2b\\ 5c-d & 4c+3d\end{bmatrix} = \begin{bmatrix}4 & -3\\ 11 & 24\end{bmatrix}$, then value of a + b – c + 2d is: a) 8 b) 10 c) 4 d) –8		

8	Given that matrices A and B are of order 3×n and m×5 respectively, then the order of matrix C = 5A +3B is: a) 3×5 and m = n b) 3×5 c) 3×3 d) 5×5		
9	For matrix A = $\begin{bmatrix} 2 & 5 \\ -11 & 7 \end{bmatrix}$, $(adjA)'$ is equal to: a) $\begin{bmatrix} -2 & -5 \\ 11 & -7 \end{bmatrix}$ b) $\begin{bmatrix} 7 & 5 \\ 11 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 7 & 11 \\ -5 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 7 & -5 \\ 11 & 2 \end{bmatrix}$		
10	Given that A = $[a_{ij}]$ is a square matrix of order 3×3 and |A| = −7, then the value of $\sum_{i=1}^{3} a_{i2}A_{i2}$, where A_{ij} denotes the cofactor of element a_{ij} is: a) 7 b) -7 c) 0 d) 49		
11	If matrix $A = \begin{pmatrix} a & b & -5 \\ c & d & 0 \\ 5 & 0 & 0 \end{pmatrix}$ is skew symmetric, then value of $2a + b + c - 3d$ is: (a) 1 (b) -1 (c) 0 (d) 2		
12	In which of the technology matrix, Hawkins- Simon conditions are satisfied (a) $\begin{pmatrix} 0.2 & 0.9 \\ 0.8 & 0.1 \end{pmatrix}$ (b) $\begin{pmatrix} 0.7 & 0.3 \\ 0.2 & 1.2 \end{pmatrix}$ (c) $\begin{pmatrix} 1.02 & 0.5 \\ 0.6 & 0.8 \end{pmatrix}$ (d) $\begin{pmatrix} 0.3 & 0.2 \\ 0.1 & 0.5 \end{pmatrix}$		
13	If A = $\begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and kA = $\begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a and b respectively are: a) $-6, -12, -18$ b) $-6, -4, -9$ c) $-6, 4, 9$ d) $-6, 12, 18$		

14

If A = $[a_{ij}]$ is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1, & when\ i \neq j \\ 0, & when\ i = j \end{cases}$, then A^2 is:

a) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$	b) $\begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix}$
c) $\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix}$	d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

15

Given that A is a non-singular matrix of order 3 such that $A^2 = 2A$, then value of $|2A|$ is:

a) 4	b) 8
c) 64	d) 16

16

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 – A	d) I

17

For A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $14A^{-1}$ is given by:

a) $14\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$	b) $\begin{bmatrix} 4 & -2 \\ 2 & 6 \end{bmatrix}$
c) $2\begin{bmatrix} 2 & -1 \\ 1 & -3 \end{bmatrix}$	d) $2\begin{bmatrix} -3 & -1 \\ 1 & -2 \end{bmatrix}$

18

Given that A = $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ and $A^2 = 3I$, then:

a) $1 + \alpha^2 + \beta\gamma = 0$	b) $1 - \alpha^2 - \beta\gamma = 0$
c) $3 - \alpha^2 - \beta\gamma = 0$	d) $3 + \alpha^2 + \beta\gamma = 0$

19

Let A = $\begin{bmatrix} 1 & \sin\alpha & 1 \\ -\sin\alpha & 1 & \sin\alpha \\ -1 & -\sin\alpha & 1 \end{bmatrix}$, where $0 \leq \alpha \leq 2\pi$, then:

a) $|A|=0$	b) $|A| \in (2, \infty)$
c) $|A| \in (2,4)$	d) $|A| \in [2,4]$

20

If A = $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$, then:

a) $A^{-1} = B$	b) $A^{-1} = 6B$
c) $B^{-1} = B$	d) $B^{-1} = \frac{1}{6}A$

CASE STUDY

The economy of a state is composed of various sectors. To understand the basic concept, we consider two sectors coal mining (sector 1) and utilities (sector 2). The coal mining produces coal and utilities produces electricity. Assume that these products are measured by their rupee value. By one unit of product we mean 1 rupee worth of that product. To produce ₹1 worth of coal the coal mining sector uses ₹0.50 of coal and ₹0.10 of electricity. To produce ₹1 worth of electricity the utilities sector uses ₹0.25 of coal and ₹0.25 of electricity.

Based on the above information, answer the following questions:

21

The technology coefficient matrix A is

(a) $\begin{pmatrix} 0.50 & 0.10 \\ 0.25 & 0.25 \end{pmatrix}$ (b) $\begin{pmatrix} 0.50 & 0.25 \\ 0.10 & 0.25 \end{pmatrix}$

(c) $\begin{pmatrix} 0.25 & 0.25 \\ 0.50 & 0.10 \end{pmatrix}$ (d) $\begin{pmatrix} 0.10 & 0.50 \\ 0.25 & 0.25 \end{pmatrix}$

22	The matrix $(I - A)^{-1}$ is (a) $\frac{1}{8}\begin{pmatrix}15 & 5\\2 & 10\end{pmatrix}$ (b) $\frac{1}{7}\begin{pmatrix}15 & 2\\5 & 10\end{pmatrix}$ (c) $\frac{1}{7}\begin{pmatrix}15 & 5\\2 & 10\end{pmatrix}$ (d) $\frac{20}{7}\begin{pmatrix}0.75 & 0.25\\0.50 & 0.10\end{pmatrix}$		
23	The system is viable because (a) $\|I - A\| > 0$ and diagonal elements of $(I - A) < 0$ (b) $\|I - A\| > 0$ and diagonal elements of $(I - A) > 0$ (c) $\|I - A\| < 0$ and diagonal elements of $(I - A) > 0$ (d) $\|I - A\| < 0$ and diagonal elements of $(I - A) < 0$		
24	If there is external demand worth ₹7000 of coal and ₹14000 of electricity, then production of two sectors to meet the demand is (a) ₹ 25000 of coal, ₹ 22000 of electricity (b) ₹ 12000 of coal, ₹ 20000 of electricity (c) ₹ 15000 of coal, ₹ 22000 of electricity (d) ₹ 27000 of coal, ₹ 22000 of electricity		
25	How much worth of coal and electricity is used internally? (a) ₹ 25000 of coal, ₹22000 of electricity (b) ₹ 22000 of coal, ₹15000 of electricity (c) ₹ 20000 of coal, ₹10000 of electricity (d) ₹ 18000 of coal, ₹8000 of electricity		
	Determinants		
1	**If A(3 ,4) B(-7, 2) and C(x, y) are collinear then** **A) x+5y+17 = 0 B) x+5y+13 = 0** **C) x-5y+17 = 0 D) None of these**		

2	The value of determinant $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$ will be equal to **A)** $a^3+b^3+c^3$ **B)** 3abc **C)** $a^3+b^3+c^3-3abc$ **D)** 0		
3	If $\begin{vmatrix} 2x & -1 \\ 4 & 2 \end{vmatrix} = \begin{vmatrix} 3 & 0 \\ 2 & 1 \end{vmatrix}$ then x is A) 3 B) 2/3 C) 3/2 D) -1/4		
4	If $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}$ then: A) $\Delta_1 = \Delta_2$ B) $\Delta_1 + 3\Delta_2 = 0$ C) $\Delta_1 + \Delta_2 = 0$ D) $\Delta_1 + 2\Delta_2 = 0$		
5	The value of $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5^5 \\ 5^4 & 5^5 & 5^6 \end{vmatrix}$ is: A) 5^2 B) 0 C) 5^{13} D) 5^6		
6	$\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$ will be equal to A $a^3+b^3+c^3$ B 3bc C $a^3+b^3+c^3-3abc$ D 0		

7	Let $\Delta = \begin{vmatrix} Ax^2 & x^3 & 1 \\ By^2 & y^3 & 1 \\ Cz^2 & z^3 & 1 \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} Ax & By & Cz \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix}$, then A $\triangle_1 + \triangle = 0$ B $\triangle_1 \neq \triangle$ C $x\triangle_1 - \triangle = 0$ D $\triangle_1 - \triangle = 0$		
8	$\Delta = \begin{vmatrix} \cos x & -\sin x & 1 \\ \sin x & \cos x & 1 \\ \cos(x+y) & -\sin(x+y) & 0 \end{vmatrix}$, lies in the interval A $[-\sqrt{2},\sqrt{2}]$ B $[-1,1]$ C $[-\sqrt{2},1]$ D $[-1,\sqrt{2}]$		
9	If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 7 & 3 \end{vmatrix}$ then value of x is A $\pm\sqrt{22}$ B 6 C 3 D $\pm\sqrt{3}$		
10	If solving a system of linear equations in 3 variables by Cramer's rule, we get $\Delta = 0$ and at least one of $\Delta_x, \Delta_y, \Delta_z$ is non-zero then the system of linear equations has (a) no solution (b) unique solution (c) infinitely many solutions (d) trivial solution		
11	If the system of equations, x + 2y – 3z = 1, (k + 3)z = 3, (2k + 1)x + z = 0 is inconsistent, then the value of *k* is (a) – 3 (b) ½ (c) 0 (d) 2		
12	If the system of equations x + ay = 0, az + y = 0 and ax + z = 0 has infinite solutions, then the value of *a* is		

	(a) –1 (b) 1 (c) 0 (d) No real values		
13	If the system of equations $x - ky - z = 0$, $kx - y - z = 0$ and $x + y - z = 0$ has a non zero solution, then the possible value of *k* are (a) – 1, 2 (b) 1, 2 (c) 0, 1 (d) – 1, 1		
14	The number of solution of the following equations $x_2 - x_3 = 1$, $-x_1 + 2x_3 = -2$, $x_1 - 2x_2 = 3$ is (a) Zero (b) One (c) Two (d) Infinite		
15	If the system of linear equation $x + 2ay + az = 0$, $x + 3by + bz = 0$, $x + 4cy + cz = 0$ has a non zero solution, then a, b, c (a) Are in A.P. (b) Are in G. P. (c) Are in H. P. (d) Satisfy $a + 2b + 3c = 0$		
16	The values of x, y, z in order of the system of equations $3x + y + 2z = 3$, $2x - 3y - z = -3$, $x + 2y + z = 4$, are (a) 2, 1, 5 (b) 1, 1, 1 (c) 1, –2, –1 (d) 1, 2, –1		
17	The system of equations $x_1 - x_2 + x_3 = 2$, $3x_1 - x_2 + 2x_3 = -6$ and $3x_1 + x_2 + x_3 = -18$ has (a) No solution (b) Exactly one solution (c) Infinite solutions (d) None of these		
18	The number of values of *k* for which the system of equations $(k + 1)x + 8y = 4k$, $kx + (k + 3)y = 3k - 1$ has infinitely many solutions, is (a) 0 (b) 1 (c) 2 (d) Infinite		

19	Value of $\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix}$ is: (a) 0 (b) x^3 (c) y^3 (d) none of these		
20	Value of $\begin{vmatrix} 1! & 2! & 3! \\ 2! & 3! & 4! \\ 3! & 4! & 5! \end{vmatrix}$ is: (a) 2 (b) 6 (c) 24 (d) 120		
	Case Study Area of a triangle whose vertices are (x_1,y_1),(x_2, y_2) and (x_3, y_3) is given by the determinant $\Delta = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ Since, area is a positive quantity, so we always take the absolute value of the determinant Δ. Also, the area of the triangle formed by three collinear points is zero. Based on the above information, answer the following questions.		

21	Find the area of the triangle whose vertices are (–2, 6), (3, –6) and (1, 5). (a) 30 sq. units (b) 35 sq. units (c) 40 sq. units (d) 15.5 sq. units		
22	If the points (2, –3), (k, –1) and (0, 4) are collinear, then find the value of $4k$. (a) 4 (b) $\frac{7}{140}$ (c) 47 (d) $\frac{40}{7}$		
23	If the area of a triangle ABC, with vertices $A(1, 3)$, $B(0, 0)$ and $C(k, 0)$ is 3 sq. units, then a value of k is (a) 2 (b) 3 (c) 4 (d) 5		
24	Using determinants, find the equation of the line joining the points $A(1, 2)$ and $B(3, 6)$. (a) $y = 2x$ (b) $x = 3y$ (c) $y = x$ (d) $4x - y = 5$		
25	If $A \equiv (11, 7)$, $B \equiv (5, 5)$ and $C \equiv (-1, 3)$, then (a) ΔABC is scalene triangle (b) ΔABC is equilateral triangle (c) A, B and C are collinear (d) None of these		