

VAISHALI EDUCATION POINT

(Quality Education Provider)

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SAMPLE PAPER — (2008-09)

Class – XII

Subject – Mathematics

General Instructions

- 1 All questions are compulsory
- 2 Q 1 – 10 carries 1 marks, Q 11 – 22 carries 4 marks Q-23to 29 carries 6 marks

1. From the following equation find the values of x and y

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

2. If A and B are symmetric show that AB is also symmetric, if $AB = BA$

3. Write in the simplest form $\tan^{-1} \left(\frac{x}{\sqrt{a^2-x^2}} \right) \quad |x| < a$

4. If $x^y = y^x$ find dy/dx

5. If $y = x^2 + 4$ x changes from 2 to 2.1, Find approximate change in y.

6. Let $f = \{(2,30),(3,4),(4,5),(5,6)\}$ find f^{-1}

7. Find the order and degree of $xy'' + \frac{3}{y'}$

8. If $p = -3i+4j-7k$ $q = 6i+2j-3k$ then find $p \times q$, prove that p is perpendicular to $p \times q$

9. Find the vector equation of the line passing through (1,2,3) and parallel to the line

$$\frac{x-2}{5} = \frac{y+3}{2} = \frac{z-1}{-3}$$

10. The mean and variance of a binomial distribution are 10 and $5/3$ respectively, Find $P(X \geq 1)$

11. Solve for x $\sin^{-1}(1-x) - 2 \sin^{-1}(x) = \pi/2$

12. Discuss the continuity of the function $f(x) = \frac{1 - \cos x}{x^2} \quad x \neq 0$
 $= \frac{1}{2} \quad x = 0 \quad \text{at } x = 0$

13. Without expanding prove that $1/a + 1/b + 1/c + 1$ is a factor of

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$$

14. If $y = \sin^{-1} \frac{x}{\sqrt{1+x^2}} + \cos^{-1} \frac{1}{\sqrt{1+x^2}}$ prove that $dy/dx = 2/(1+x^2)$
15. Find the points on the curve $y = 3x^2 - 9x + 8$ at which the tangents are equally inclined with the axes.
16. Evaluate $\int \frac{x^2 - 5}{x^2 - 3x + 2} dx$
17. Solve $ye^y dx = (y^3 + 2xe^y) dy$ 4m away from the wall
18. $\int_0^a \frac{dx}{x + \sqrt{a^2 - x^2}}$
19. Find the relation between α and β such that $\alpha a + \beta b$ is perpendicular to c where $a = 3i - 2j + k$, $b = i + 2j - 3k$, $c = -i + j + 2k$
20. Prove that the planes $r \cdot (i - j + k) = 4$ and $r \cdot (3i + 2j - k) - 11 = 0$ are perpendicular to each other.
21. The probability that a patient recovers from rare disease is 0.4. If 10 people have caught this disease, Find the probability i) exactly 3 recover ii) atleast 7 recover iii) from 3 to 5 recover
22. A ladder is 5m long is leaning against a wall. The bottom of the ladder is pulled along the ground, away from the wall, at the rate of 2cm/sec. How fast is its height on the wall decreasing when the bottom of the ladder is 4m away from the wall
23. Let $f: R_+ \rightarrow A$ be a function defined as $f(x) = 4x^2 + 12x + 15$ Find A where $A = \text{range of } f$. Show that f is invertible. Also find the value of f^{-1}
24. The cost of 4kg onion, 3kg wheat and 2 kg rice is Rs 60. The cost of 2kg onion, 4kg wheat and 6kg rice is rs 90. The cost of 6kg onion, 2kg wheat and 3kg rice is rs 70. Find the cost of each item per kg by matrix method.
- (or) Find the inverse using elementary operations $\begin{pmatrix} 2 & 5 & 3 \\ 3 & 4 & 1 \\ 1 & 6 & 2 \end{pmatrix}$
25. A firm can sell x items at a price of Rs(330-x) each. The cost of manufacturing x items is Rs($x^2 + 10x + 12$). Find the number of items the firm should sell to make maximum profit.
26. Evaluate $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}}$
- (or). Find the area enclosed by the region in the first quadrant enclosed by the ellipse $x^2/4 + y^2/36 = 1$ and the line $3x + y = 6$
27. Find the equations of the plane parallel to the plane $x - 2y + 2z - 3 = 0$ and which are at a unit distance from the point(1,1,1)
28. A shop keeper has 20kg of plain biscuits and 30kg of coconut biscuits. He prepares of his own 1 kg mixture of biscuits as follows.

	Plain	Coconut
Type 1	1/2 kg	1/2 kg
Type 2	1/3 kg	2/3 kg

He can make a profit of Rs 4 per kg on type 1 and Rs 5 per kg on type 2, assuming that he can sell all the biscuits of each type which he prepares, how should he use his supplies to gain maximum profit. What is the profit.

29. Two groups are competing for the the position on Board of directors of a corporation. The probabilities that the First and the second groups will win are 0.6 and 0.4 respectively. Further if the First group wins the probability of introducing a new product is 0.7 and 0.3 if the second group wins. Find the probability the new product was introduced by second group.

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