MATHS

BOOKS - SHARAM PUBLICATION

MODEL QUESTION PAPER-2

Exercise

1. Write the smallest reflexive relation on set $\{1, 2, 3, 4\}$.

▶ **Watch Video Solution**

2. If $\tan^{-1}x + \tan^{-1}y = \dfrac{\pi}{4}$, $xy < 1$,

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

3. What is the value of : $\begin{vmatrix} 4 & a & b+c \\ 4 & b & c+a \\ 4 & c & a+b \end{vmatrix}$

4. If $\begin{bmatrix} x+y & x-y \\ 2x-z & 0 \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ 8 & 0 \end{bmatrix}$ find the value of x, y, z.

5. Write the value of $\dfrac{dy}{dx}$ if

$$y = \sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ...\infty}}}.$$

6. What is the interval in which

$f(x) = x^3 - 3x^2 + 3x - 10$ is strictly increasing ?

7. Evaluate : $\displaystyle\int_2^4 \dfrac{x}{x^2 + 1} dx.$

8. Find the differential equation whose solution is $y = a \cos 2x + b \sin 2x$.

9. Find the value of p for which the vectors $3\hat{i} + 2\hat{j} + 9\hat{k}$ and $\hat{i} - 2p\hat{j} + 3\hat{k}$ are parallel.

10. Write the vector equation ofthe line given by $\dfrac{x-5}{3} = \dfrac{y+4}{7} = \dfrac{z-6}{2}$.

11. If A = {1, 2, 3}, B = {4, 5, 6, 7} and f = {(1, 4), (2, 5), (3, 6)} is a function from A to B. State whether f is one-one or not.

> ▶ **Watch Video Solution**

12. Solve: $\tan^{-1} x + 2 \cot^{-1} x = \dfrac{2\pi}{3}$

> ▶ **Watch Video Solution**

13. if $*$ is the binary operation on N given by $a * b$= L. C. M of a and b. Find $20 * 16$. Is $*$ Commutative.

> ▶ **Watch Video Solution**

14. Prove that

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

> ▶ Watch Video Solution

15. Using elementary operation find the inverse of $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

> ▶ Watch Video Solution

16. Construct a 2×3 matrix whose element are given by $a_{ij} = i + j$.

> ▶ Watch Video Solution

17. Find the value of $\begin{vmatrix} 17 & 58 & 97 \\ 19 & 60 & 99 \\ 18 & 59 & 98 \end{vmatrix}$ without expanding.

18. Find the value of k, so that the function defined by $f(x) = \begin{cases} kx + 1, & \text{if } x \leq \pi \\ \cos x, & \text{if } x > \pi \end{cases}$ is continuous at $x = \pi$.

19. Find the slope of the tangent to the curve $x = \sin 3t, y = \cos 2t, at\, t = \dfrac{\pi}{4}$.

20. If $f(x) = a$ In $x + bx^2 + x$ has extreme values at $x = -1$ and $x = 2$ then find a and b.

21. Evaluate: $\int \dfrac{\log \sin x}{\tan x} dx.$

22. Evaluate $\int \dfrac{dx}{x(x^5 + 3)}.$

23. Evaluate $\displaystyle\int_0^{\pi/4} \log(1 + \tan x)\,dx$.

▶ Watch Video Solution

24. Determine the area the of the region between the curves y=cos x and y=sin x, bounded by x =0.

▶ Watch Video Solution

25. Solve the differential equation $(1 + x^2)\dfrac{dy}{dx} + y = \tan^{-1} x$

▶ Watch Video Solution

26. Vectors $\vec{a}, \vec{b}, \vec{c}$ are such that $\vec{a} + \vec{b} + \vec{c} = 0$ and $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 5$ and $\left|\vec{c}\right| = 7$. Find the angle between $\vec{a}$ and $\vec{b}$.

27. Show by vector method that the line joining the points $(1, 4, 2)$ and $(-1, 1, -2)$ is perpendicular to the line joining the points $(2, -3, 4)$ and $(5, 3, -2)$.

28. Find the co-ordinates of the point where the perpendicular from the origin meets the line joining the points $(-9, 4, 5)$ and $(11, 0, -1)$.

29. Find the equation of the plane passing through the line x = y = z and the point (3,2,1).

30. Find the co-ordinates of a point where the line $\dfrac{x-2}{3} = \dfrac{y+1}{4} = \dfrac{z-2}{2}$ intersect the plane $x - y + z = 5$.

31. Solve for

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

.

32. Find graphically the maximum value of $z = 2x + 5y$

subject to the constraints

$2x + 4Y \leq 8, 3x + y \leq 6, x \geq 0, y \geq 0.$

33. Find the values of a and b such that the function f

defined by $f(x) = \begin{cases} ax^2 + b & \text{if } x < 1 \\ 1 & \text{if } x = 1 \\ 2ax + b & \text{if } x > 1 \end{cases}$.

34. Find (dy)/(dx) if $y = x^x + (\sin x)^x$.

35. Find the equations of the tangent to the curve

$y = x^2 - 2x + 7$, which is

(i) parallel to the line $2x - y + 9 = 0$.

(ii) perpendicular to the line $5y - 15x = 13$.

36. Evaluate:- $\int \dfrac{x \sin^{-1} x}{\sqrt{1 - x^2}} dx.$

37. Evaluate $\int_0^{\pi} \dfrac{x}{1 + \sin x} dx$

38. If $\vec{a}, \vec{b}$ and $\vec{c}$ are three vectors such that $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 5$ and each one of these is perpendicular to the sum of other two, then find $\left|\vec{a} + \vec{b} + \vec{c}\right|.$

39. Find the coordinates of foot of perpendicular drawn from the point (0, 2, 3) on the line $\dfrac{x+3}{5} = \dfrac{y-1}{2} = \dfrac{z+4}{3}$. Also, find the length of perpendicular.