CLASS XII
GUESS PAPER
MATHEMATICS

Section A

(1 x 4 = 4)

Q1. Find a unit vector parallel to the sum of the vectors a = 2i + 4j – 5k and b = i + 2j +3k

Q2. Prove that : $\tan^{-1}(-1) + \cos^{-1}(-\frac{1}{\sqrt{2}}) = \frac{\pi}{2}$.

Q3. If f(x)= 3x -2 find $f^{-1}$of

Q4. If A = $\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$, find $|adjA|$

Section B

(2 x 8 = 16)

Q5. Find the area of the triangle whose vertices are (1,4),(2,4) and (4,2) by using determinants.

,Q6. Find the equation of the tangent to the curve f(x) = sin x at (0,0)

Q7. Evaluate $\int \frac{2x+1}{1+x^2}$ dx.

Q8. Find the projection of the vector $\vec{a}$ = 2i + 3 j – k on, $\vec{b}$ = i + 3j + 2k.

Q9. Find the vector equation of the line passing through the points (-1,0 , 2) and (3 ,4 , 6)

Q10. Differentiable $y = x^{\sin x}$, x > 0 with respect to x .

Q11 Find the intercept cut by the plane 3x – y- 3z =9 on Z-axis.

. Q12. Evaluate : $\int \frac{dx}{\sqrt{x^2 - 5x + 6}}$

Section C

(4 x 11= 44)

Q13. If y = $\sqrt{a^2 - x^2}$, prove that x + y $\frac{dy}{dx} = 0$

OR

Form the differential equation of the family of circles touching the y-axis.

Q14. By using the properties of determinants, show that $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$

Q15. Let * be a binary operation on the set Q of rational numbers as : a * b = a +2b
(i) Q is closed under the given operation
(ii) Is * is commutative. (iii) Is * is associative

Q16. Find the shortest distance between the lines r = i + j + λ(2i – j +k) and
r = 2i + j – k + μ (3i – 5j +2k)

Q17. Find the probability distribution of the number of heads in a single throw of three coins and find the mean of this distribution.

Q18. Find the value of $\tan\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right)$

OR

If $\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$ then find the value of x.

Q19. Evaluate: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$

Q20. Evaluate: $\int \sqrt{x^2+4x+1}dx$

Q21. Find $\frac{dy}{dx}$ if $y = \sin^{-1}(2x\sqrt{1-x^2})$

OR

Verify Rolle's theorem for the function $f(x) = x^2 + 2x - 8$, $x \in [-4, 2]$

Q22. Find the value of k so that the function $f(x) = \begin{cases} \frac{K\cos x}{\pi - 2x}, & \text{if } x \neq \pi/2 \\ 3, & \text{if } x = \pi/2 \end{cases}$

is continuous at $x = \pi/2$

Q23. Find the particular solution of $\frac{dy}{dx} + 2y\tan x = \sin x$ given that y =0 when $x = \pi/3$

OR

Solve the given differential equation: $(1+e^{x/y}) + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$

Section D(6 x 6 = 36)

Q24. Given that $A = \begin{vmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{vmatrix}$ and $B = \begin{vmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{vmatrix}$, find AB .

Use this to solve the following system of equations

$x - y = 3$, $2x + 3y + 4z = 17$, $y + 2z = 7$

Q25. Find the equation of the plane passing through the line of intersection of the planes $3x - y + 2z - 4 = 0$ and $x + y + z - 2 = 0$ and the point (2,2,1)

OR

Find the image of the point (3,-2,1) in the plane $3x - y + 4z = 2$

Q26 A dietician has to develop a special diet using two foods P and Q. Each packet of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6units of vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and atmost 300 units of cholesterol. How many packets of each food should be used to minimize the amount of vitamin A in the diet ? What is the min amount of vitamin A ?

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Q27 Find the area of the region bounded by the curves $x^2 = y$, $y = x + 2$, x- axis.

Q28 Show that the semi –vertical angle of right circular cone of given surface area and maximum volume is $\sin^{-1}(\frac{1}{3})$

Q29 A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be hearts. Find the probability of the missing card to be a heart.

OR

A letter is known to have come from either TATANAGAR or KOLKOTTA. On the envelop two letters TA are visible . What is the probability that it has come from (i) TATANAGAR (ii) KOLKOTTA.

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