

Q16. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{j} - \hat{k}$ then, find a vector \vec{c} such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a} \cdot \vec{c} = 3$.

Show that if the vectors \vec{a}, \vec{b} and \vec{c} are coplanar vectors then $\vec{a} + \vec{b}, \vec{b} + \vec{c}$ and $\vec{c} + \vec{a}$ are also OR coplanar vectors.

Consider $f: \mathbb{R}_+ \to [-5,\infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is an invertible function. **Q17. Q18.** Evaluate : $\int \sqrt{\frac{x}{a^3 - x^3}} \, dx$.

Hence find f^{-1} .

A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability Q19. distribution of the number of successes.

OR Find P($|x-4| \le 2$) if x follows a Binomial Distribution with the mean 4 and variance 2.

SECTION – C Find the area of the region bounded by the curve $y = x^2 + x$, x-axis and the line x = 2 and x = 5. **O20.** Using properties of determinant, prove that : 021.

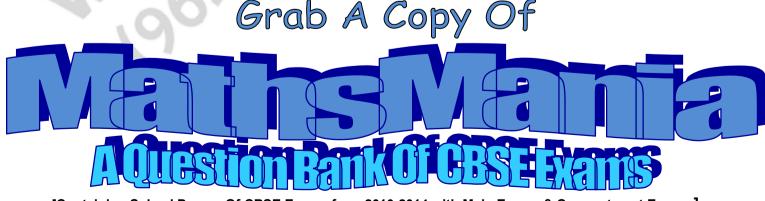
$$\begin{vmatrix} a^{2} & a^{2} - (b - c)^{2} & bc \\ b^{2} & b^{2} - (c - a)^{2} & ca \\ c^{2} & c^{2} - (a - b)^{2} & ab \end{vmatrix} = (a - b)(b - c)(c - a)(a + b + c)(a^{2} + b^{2} + c^{2}).$$

- Show that the height of a cylinder which can be inscribed in a cone of height h is h/3. **O22**.
 - Find the maximum area of an isosceles triangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with its OR

vertex at one end of major axis.

- **Q23.** Evaluate : $\int_{-a}^{a} \sqrt{\frac{a-x}{a+x}} dx$.
- An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 bus drivers. The **O24**. probability of an accident involving a scooter, a car and a bus are respectively 0.01, 0.03 and 0.15. One of the insured persons meets with an accident. What is the probability that he is a scooter driver? Explain the importance of public transport system over private vehicles in two points.
- A manufacturer of electronic circuits has a stock of 200 resistors, 120 transistors and 150 capacitors O25. and is required to produce two types of circuits A and B. Type A requires 20 resistors, 10 transistors and 10 capacitors. Type B requires 10 resistors, 20 transistors and 30 capacitors. If the profit on type A circuit is ₹50 and that of type B circuit is ₹60, formulate this as a linear programming problem so that the manufacturer can maximize his profit. Also solve the L.P.P. graphically to find the maximum profit. The owner of this manufacturing unit is knowingly producing defective circuitries with an aim of earning more money. How would you stop him doing that by making him conscious of his wrong act?
- Find the equation of the plane which passes through the points (3, 4, 1) and (0, 1, 0) and is parallel Q26. to the line : $\frac{x+3}{2} = \frac{y-3}{7} = \frac{z-2}{5}$.

OR Find the equation of a plane which is perpendicular to the planes 2x + 3y - 3z = 2 and 5x - 4y + z = 6 and passes through the point (-1, -1, 2).



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