

India's Number 1 Education App

MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MODEL PAPER 12

Section A Very Short Answer Type Questions

1. If the function
$$f$$
 is defined by $f(x)=\left\{egin{array}{ll} 3x-2,&x>3\\ x^2-2,&-2\leq x\leq 2\\ 2x-1,&x<-3 \end{array}
ight.$

then find the values, if exist, of (i) f(4)



2. Find the domain of the real function $\log (x^2 - 4x + 3)$



.....

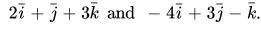
3. Construct a 3 imes 2 matrix whose elements are defined by $a_{ij}=rac{1}{2}|i-3j|$



- **4.** IF $A = \left[egin{array}{cc} 2 & 4 \\ -1 & k \end{array}
 ight]$ and $A^2 = 0$ then find the value of k
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- **5.** If ar a=2ar i+5ar j+ar k and ar b=4ar i+mar j+nar k are collinear vectors then find m,n.
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6. Find the vector equation of the line passing through the points



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7. If the vectors $2ar i+\lambdaar j-ar k$ and 4ar i-2ar j+2ar k are perpendicular to each other than find $\lambda.$



8. If $\sec \theta + \tan \theta = 5$, find the quadrant in which θ lies and find the value of $\sin \theta$.



9. Prove that $\sin^2 52 \frac{1}{2} - \sin^2 22 \frac{1}{2}$.

10. $(\cos hx - \sin hx)^n$ =

Section B Short Answer Type Questions

1. If $A = \begin{bmatrix} 1 & -2 & 1 \\ 0 & 1 & -1 \\ 2 & 1 & 1 \end{bmatrix}$ then show that $A^3 - 3A^2 - A - 3I = O$,

$$3ar i-2ar j-ar k,$$
 $2ar i+3ar j-4ar k,$ $-ar i+ar j+2ar k,$ $4ar i+5ar j+\lambdaar k$ are coplanar, then show that $\lambda=-rac{146}{17}.$



3. If
$$ar a=2ar i+3ar j+4ar k,$$
 $ar b=ar i+ar j-ar k,$ $ar c=ar i-ar j+ar k$, compute

 $\bar{a}x(\bar{b}x\bar{c})$ and verify that it is perpendicular to \bar{a} .



4. Prove that
$$\sin 78^\circ + \cos 132^\circ = \frac{\sqrt{5}-1}{4}$$
.



5. Solve the equation $1+\sin^2\theta=3\sin\theta\cos\theta$.



7. If
$$a=(b-c)\sec\theta$$
, then prove that $\tan\theta=\frac{2\sqrt{bc}}{b-c}\frac{\sin A}{2}$.



Section C Long Answer Type Questions

1. If $f\colon A o B$ and $g\colon B o A$ are two functions such that $gof=I_A$ and $fog=I_B$ then $g=f^{-1}$.



- **2.** Prove that $a+ar+ar^2+.....$ $+n ext{terms}=rac{a(r^n+1)}{r-1}, r
 eq 1$
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3.
$$\begin{vmatrix} a-b-c & 2b & 2c \ 2a & b-c-a & 2c \ 2a & 2b & c-a-b \end{vmatrix} =$$



4. Solve the equations x+y+z=9, 2x+5y+7z=52, 2x+y-z=0, by Gauss-

 $ar{a}=2ar{i}+ar{j}-3ar{k},\,ar{b}=ar{i}-2ar{j}+ar{k},\,\overline{C}=\,-\,ar{i}+ar{j}-4ar{k},\,\overline{D}=\,ar{i}+ar{j}+ar{k}$

If

Jordan Method.

5.

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, then compute $\left|\left(ar{a} imesar{b}
ight) imes\left(ar{c} imesar{d}
ight)
ight|$.

6. In triangle ABC, prove that $\cos \frac{A}{2} + \cos \frac{B}{2} + \cos \frac{C}{2} = 4 \cos \frac{\pi - A}{4} \cos \frac{\pi - B}{4} \cos \frac{\pi - C}{4}$



7. In $\triangle ABC$, show that $\frac{ab-r_1r_2}{r_3}=\frac{bc-r_2r_3}{r_1}=\frac{ca-r_3r_1}{r_2}$



Section A Very Short Answer Type Questions

(i) parallel (ii) perpendicular to the straight line passing through

1. Find the equation of the straight line passing through A(-1,3) and

- B(2,-5),C(4,6)
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2. If the area of the triangle formed by the straight lines x=0, y=0 and 3x+4y=a(a>0 is 6. Find the value of a.



3. If (3, 2, -1) (4, 1,-1) and (6,2,5) are three vertices and (4, 2, 2) is the centroid of a tetrahedron, then find the fourth vertex.



- **4.** Find the equation of the plane whose intercepts on x, y, z axes are
- 1, 2, 4 respectively.
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6. Compute
$$\mathop{
m Lt}_{x
ightarrow 0} rac{1-\cos 2mx}{\sin^2 nx} (m,n\in Z).$$

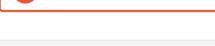
7. If $f(x) = \log(\sec x + \tan x)$, then find f'(x).

8. Find the derivative of the function $\sin^{-1}(3x-4x^3)$.





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9. If an error of 3% occurs in measuring the side of a cube, find the percentage error in its volume.

10. Find the value of 'c' in Rolle's theorem for the function f(x)=(x-1)(x-2)(x-3) on [1,3].



Section B Short Answer Type Questions

1. Find the equation of locus of a point such that the difference of whose distances from (-5,0) and (5,0) is 8



2. When the axes rotated through an angegle $\frac{\pi}{4}$, find the transformed equation of $3x^2+10xy+3y^2=9$.

3. Find the value of k if the angle between the straight lines

$$4x-y+7=0, kx-5y-9-0$$
 is 45°



4. Check the continity of the following function at 2 .

$$f(x) = \left\{ egin{array}{ll} rac{1}{2}ig(x^2-4ig) & ext{if} \;\; 0 < x < 2 \ 0 & ext{if} \;\; x = 2 \ 2 - 8x^{-3} & ext{if} \;\; x > 2 \end{array}
ight.$$

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- 5. Find the derivative of the function tan 2x from the first principle.
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6. A container in the shape of an inverted cone has height 12 cm and radius 6cm at the top. If it is filled with water at the rate of $12cm^3/\mathrm{sec}$, what is the rate of change in the rate of change in the height of water level when the tank is filled 8 cm?



7. Show that the area of the triangle formed by the tangent at any point on the curve xy=c, (c \neq 0), with the coordinate axes is constant.



Section C Long Answer Type Questions

1. Find the circumcentre of the triangle whose sides are 3x-y-5=0, x+2y-4=0 and 5x+3y+1=0.

2. If $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents two parallel lines then prove that $h^2=ab$.



3. If $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents two parallel lines then prove that $af^2=bg^2.$



4. If $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents two parallel lines then prove that the distance between the parallel lines is $2\sqrt{\frac{g^2-ac}{a(a+b)}}$ or $2\sqrt{\frac{f^2-bc}{b(a+b)}}$.



5. Find the angle between the lines joining the origin to the points of intersection of the curve $x^2+2xy+y^2+2x+2y-5=0$ and the line 3x-y+1=0.



6. Find the angle between the lines whose direction cosines satisfy the equaitons l+m+n=0, $l^2+m^2-n^2=0.$



7. If
$$\sqrt{1-x^2}+\sqrt{1-y^2}=a(x-y)$$
, then show that $rac{dy}{dx}=rac{\sqrt{1-y^2}}{\sqrt{1-x^2}}.$

8. S.T the curves $y^2=4(x+1), y^2=36(9-x)$ intersect orthogonally.



9. Show that when the curved surface of a is right circular cylinder inscribed in a sphere of radius R is maximum , then the height of the cylinder is $\sqrt{2R}$.

