NAVODAYA VIDYALAYA SAMITI

SECOND PRE BOARD EXAMINATION-2018

ROLL No: | | | | | | **CODE: 041/1**

CLASS: XII
MATHEMATICS

Time Allowed: 3 hours **Maximum Marks:100**
General Instructions:

1. *All questions are compulsory*
2. *This question paper consists of **29** questions divided into three sections A, B, C and D. Section A comprises of **4** questions of **one mark** each, section B comprises of **8** questions of **two marks** each, C comprises of **11** questions of **four marks** each and section D comprises of **6** questions of **six marks** each*
3. *All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question*
4. *There is no overall choice. However, internal choice has been provided in 03 questions of four marks each and 03 questions of six marks each. You have to attempt only one of the alternatives in all such questions.*
5. *Use of calculators is not permitted.*

SECTION- A

Question numbers 1 to 4 carry 1 mark each.

1. If for any 2×2 square matrix, $A(adjA) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$ Find $|A|$.
2. Evaluate: $\int_0^2 e^{logx}\, x^3 dx$
3. The Cartesian equations of a line AB are $\frac{2x-1}{3} = \frac{y-2}{6} = \frac{7-z}{-2}$ Find the direction ratios of the line parallel to AB
4. Find the differential equation representing the family of curves $y = mx + c$, where m and c are arbitrary constants.

SECTION- B

Question numbers 5 to 12 carry 2 marks each.

5. The volume of a cube is increasing at the rate of 9 cm^3/sec. How fast is its surface area increasing, when the length of the side is 10 cm ?
6. For what value of k,is the following function continuous at x=0

f(x)= $\begin{cases} \dfrac{1-\cos 4x}{8x^2}, & when, x \neq 0 \\ k, & when, x = 0 \end{cases}$

7. Find $\frac{dy}{dx}$ at $t = \frac{2\pi}{3}$ when $x = 10\,(t - \sin t)$ and $y = 12\,(1 - \cos t)$.
8. A line passes through the point with position vector $2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$ and is perpendicular to the plane $\vec{r}.(3\hat{\imath} + 4\hat{\jmath} - 5\hat{k}) = 7$. Find the equation of the line in cartesian and vector forms.
9. Find the general solution of the Differential equation

   $sec^2 y . \tan x\, dy + sec^2 x \tan y\ dx = 0.$
10. If $P(A) = 0 \cdot 4, P(B) = p, P(A\ U\ B) = 0 \cdot 6$ and A and B are given to be independent events, find the value of $'p'$.
11. Find the value of $x + y$ from the following matrix equation:

$$2\begin{pmatrix} x & 5 \\ 7 & y-3 \end{pmatrix} + \begin{pmatrix} 3 & -4 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 7 & 6 \\ 15 & 14 \end{pmatrix}$$

12. Integrate: $\int \frac{dx}{x(x^n+1)}$

SECTION- C

Question numbers 13to 23 carry 4 marks each.

13. Using properties of determinants prove that $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$

   $=a^3$.
14. Solve for x: $\tan^{-1}\frac{x-3}{x-4}$.$+\tan^{-1}\frac{x+3}{x+4} = \frac{\pi}{4}$
15. If $x^y + y^x + x^x = a^b$, find $\frac{dy}{dx}$.

OR

   If $x^y = e^{x-y}$ Show that $\frac{dy}{dx} = \frac{logx}{(1+logx)^2}$

16. Find $\int \frac{cosx\ dx}{(4+sin^2x)(5-4cos^2x)}$
17. Solve the differential equation $(\tan^{-1} x - y)\, dx = (1 + x^2)\, dy$.

OR

   Find the general solution of the differential equation

   $\frac{dy}{dx} = \frac{\sqrt{x^2+y^2}}{x} + \frac{y}{x} \quad ,x > 0$
18. If $\vec{a}, \vec{b}, \vec{c}$ are coplanar prove that $\vec{a} + \vec{b}, \vec{b} + \vec{c}, \vec{c} + \vec{a}$ are coplanar.

19. Find the distance between the point P(6, 5, 9) and the plane determined by the points A(3, -1, 2), B(5, 2, 4), and C(-1, -1, 6).

20. If two curves $xy = k$ &$y^2 = x$ cut at right angles,then show that $8k^2 = 1$.

21. Evaluate: $\int_0^{\frac{\pi}{4}} \log(1 + tanx)\, dx$

OR

Evaluate: $\int_{-\pi}^{\pi} \frac{2x(1+sinx)dx}{1+cos^2 x}$

22. In answering a question on a MCQ test with 4 choices per question, a student knows the answer, guesses or copies the answer. Let $\frac{1}{2}$ be the probability that he knows the answer, $\frac{1}{4}$ be the probability that he guesses and $\frac{1}{4}$ that he copies it. Assuming that a student, who copies the answer, will be correct with the probability $\frac{3}{4}$, what is the probability that the student knows the answer, given that he answered it correctly?

23. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of diamond cards drawn. Also, find the mean and the variance of the distribution.

SECTION- D

Question numbers 24to 29 carry 6 marks each.

24. Let $A = Q \times Q$ and let * be a binary operation on A defined by $(a,b) * (c,d) = (ac, b + ad)\, for\, (a,b),(c,d) \in A$. Determine, whether * is commutative and associative.

Then, with respect to * on A (i) Find the identity element in A. (ii) Find the invertible elements of A.

OR

Let f: N $\rightarrow R$ be a function defined as f (x) = $4x^2 + 12x + 15$ .Show that f: N $\rightarrow S$ where S is the range of f, is invertible .Find the inverse of f .

25. Find the Cartesian as well as vector equations of the planes through the intersection of the planes $\vec{r}.(\hat{\imath} + 3\hat{\jmath}) + 6 = 0$ and $\vec{r}.\left(3\hat{\imath} - \hat{\jmath} + 4\hat{k}\right) = 0$ which are at a unit distance from the origin.

26. Three shopkeepers A, B, C are using polythene, handmade bags (prepared by prisoners), and newspaper‘s envelope as carry bags. it is found that the shopkeepers A, B, C are using (20,30,40) , (30,40,20,) , (40,20,30) polythene , handmade bags and newspapers envelopes respectively. The shopkeepers A, B, C spent ₹250, ₹220 &₹ 200 on these carry bags respectively .Find the cost of each carry bags using matrices. Keeping in

mind the social & environmental conditions, which shopkeeper is better? & why?

OR

Using elementary transformation find the inverse of A= $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}$, hence solve the matrix equation $XA = [1 \quad 0 \quad 1]$

27. The sum of the perimeters of a circle and a square is k, where k is a constant. Prove that the sum of their areas is minimum, if the side of the square is double the radius of the circle.

OR

Show that height of the cylinder of greatest volume which can be inscribed in a right circular cone of height $h$and semi vertical angle $\alpha$is one-third that of the cone and the greatest volume of cylinder is $\frac{4}{27}\pi h^3 tan^2\alpha$.

28. Using integration, find area of the region $\{(x, y): y^2 \leq 4x,\ 4x^2 + 4y^2 \leq 9\}$.

29. In a mid-day meal program, an NGO wants to provide vitamin rich diet to the students of an MCD school .The dietician of the NGO wishes to mix two types of food in such a way that vitamin contents of the mixture contains at least 8 units of vitamin A and 10 units of vitamin C. Food 1 contains 2 units per kg of vitamin A and 1 unit per kg of vitamin C. Food 2 contains 1 unit per Kg of vitamin A and 2 units per kg of vitamin C. It costs ₹50 per kg to purchase Food 1 and ₹70 per kg to purchase Food 2. Formulate the problem as LPP and solve it graphically for the minimum cost of such a mixture?

MARKING SCHEME FOR MATHEMATICS -2018

QN NO	ANSWERS	MARK
1	$\|A\|$ =8	1m
2	$\frac{32}{5}$	1m
3	3:12:4	1m
4	$\frac{d^2y}{dx^2}$ =0	1m
5	Let V be the volume of cube with side a cm V= $a^3 \frac{dv}{dt}$ = $3a^2\frac{da}{dt}$, $\frac{da}{dt} = \frac{3}{100}$ cm/sec Surface area ,A= $6a^2$,$\frac{dA}{dt}$ = $12a\frac{da}{dt}$ $\frac{dA}{dt}$ =3.6 cm^2/sec	1m $\frac{1}{2}$ m $\frac{1}{2}$ m
6	$\lim_{X\to 0} f(x) = \lim_{X\to 0} \frac{2sin^2 2x}{8x^2}$ =1 f(0) =k k=1	1m $\frac{1}{2}$ m $\frac{1}{2}$ m
7	$\frac{dy}{dt}$=12sint ,$\frac{dx}{dt}$=10(1-cost) $\frac{dy}{dx}=\frac{6sint}{5(1-cost)}$ $\frac{dy}{dx}$ at t=$\frac{2\pi}{3}$ = $\frac{6}{5\sqrt{3}}$	$\frac{1}{2}$ m +$\frac{1}{2}$ m $\frac{1}{2}$ m $\frac{1}{2}$ m
8.	Vector equation is $\bar{r} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k} + \mu(3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$ Cartesian equation is $\frac{x-2}{3} = \frac{y+3}{4} = \frac{z-4}{-5}$	1m 1m
9.	Dividing each term by tanxtany $\frac{sec^2x}{tanx}$dx +$\frac{sec^2y}{tany}$ dy =0 Solution is tanxtany =c or log(tanx) +log(tany)=c	1m 1m
10	If A & B are independent events then P(A∩ $B) = P(A)P(B)$ P(A∩ $B) = 0.4p$ P(AUB) = P(A) +P(B) –P(A∩ B) p =$\frac{1}{3}$	$\frac{1}{2}$ m $\frac{1}{2}$ m 1m
11	Getting $\begin{pmatrix} 2x+3 & 6 \\ 15 & 2y-4 \end{pmatrix} = \begin{pmatrix} 7 & 6 \\ 15 & 14 \end{pmatrix}$ Getting $x = 2, y = 9$ $x + y = 11.$	½ 1

<table>
<tr><td>12</td><td>Multiply Nr &Dr by x^{n-1}
$$\int \frac{x^{n-1}dx}{x^n(x^n+1)}$$
Substitute $u=x^n$
$\frac{1}{u(u+1)}=\frac{1}{u} - \frac{1}{u+1}$(by partial fraction)
$\int \frac{dx}{x(x^n+1)} = \frac{1}{n}\log\frac{x^n}{x^n+1}$ +c</td><td>$\frac{1}{2}$ m
$\frac{1}{2}$ m
$\frac{1}{2}$ m
$\frac{1}{2}$ m</td></tr>
<tr><td>13</td><td>. Splitting the determinant along C_2
$= \begin{vmatrix} a & a & a+b+c \\ 2a & 3a & 4a+3b+2c \\ 3a & 6a & 10a+6b+3c \end{vmatrix} + \begin{vmatrix} a & b & a+b+c \\ 2a & 2b & 4a+3b+2c \\ 3a & 3b & 10a+6b+3c \end{vmatrix}$
The second determinant becomes 0 as C_1 and C_2 are proportional
$=\begin{vmatrix} a & a & a \\ 2a & 3a & 4a \\ 3a & 6a & 10a \end{vmatrix} + \begin{vmatrix} a & a & b \\ 2a & 3a & 3b \\ 3a & 6a & 6b \end{vmatrix} + \begin{vmatrix} a & a & c \\ 2a & 3a & 2c \\ 3a & 6a & 3c \end{vmatrix}$
The second and the third determinants are 0 as the columns are propotional
$= \begin{vmatrix} a & a & a \\ 2a & 3a & 4a \\ 3a & 6a & 10a \end{vmatrix}$
Applying $C_2 \rightarrow C_2-C_1$ and $C_3 \rightarrow C_3-C_1$
$= \begin{vmatrix} a & 0 & 0 \\ 2a & a & 2a \\ 3a & 3a & 7a \end{vmatrix}$
Expanding along R_1
$a(7a^2- 6a^2) = a^3$</td><td>1m
1m
1m
1m</td></tr>
<tr><td>14</td><td>$\tan^{-1}\frac{x-3}{x-4}.+\tan^{-1}\frac{x+3}{x+4} = \frac{\pi}{4}$
$\tan^{-1}\left(\frac{\frac{x-3}{x-4}+\frac{x+3}{x+4}}{1-\frac{(x-3)(x+3)}{(x-4)(x+4)}}\right)=\frac{\pi}{4}$
$\frac{2x^2-24}{-7}=1$
$x=\pm\sqrt{\frac{17}{2}}$</td><td>1m
2m
1m</td></tr>
<tr><td>15</td><td>$u=x^y$ $v=y^x$,$w=x^x$
$u+v+w=a^b$</td><td>1m</td></tr>
</table>

	$\frac{du}{dx}+\frac{dv}{dx}+\frac{dw}{dx}=0$ $$\frac{du}{dx}=x^y\left(\frac{y}{x}+logx\frac{dy}{dx}\right)$$ $$\frac{dv}{dx}=y^x(\frac{x}{y}\frac{dy}{dx}+logy)$$ $$\frac{dw}{dx}=x^x(1+logx)$$ $$\frac{dy}{dx}=\frac{-(x^x+x^xlogx+x^{y-1}y+y^xlogy)}{(x^ylogx+xy^{x-1})}$$ OR ylogx=(x-y)loge ylogx=x-y $y=\frac{logx}{(1+logx)}$ $\frac{dy}{dx}=\frac{logx}{(1+logx)^2}$	2m 1m 1m 1m 2m
16	$\int\frac{cosxdx}{(4+sin^2x)(5-4cos^2x)}=\int\frac{cosxdx}{(4+sin^2x)(1+4sin^2x)}$, substitute u=sinx $=\int\frac{du}{(4+u^2)(1+4u^2)}$, $=\frac{-1}{15}\int\frac{du}{4+u^2}+\frac{4}{15}\int\frac{du}{1+4u^2}$ $=\frac{-1}{30}\tan^{-1}\frac{sinx}{2}+\frac{2}{15}\tan^{-1}2sinx$ +C	1m 2m 1m
17	Differential equation is $\frac{dx}{dy}+\frac{x}{1+y^2}=\frac{\tan^{-1}y}{1+y^2}$ Integrating factor is $e^{\tan^{-1}y}$ Solution is $xe^{\tan^{-1}y}=e^{\tan^{-1}y}(\tan^{-1}y-1)$ + c OR Substituting y =vx Differential equation is $\frac{dv}{\sqrt{(1+v^2}}=\frac{dx}{x}$ Integrating the solution is $y+\sqrt{(x^2+y^2)}$ = cx	1m 1m 2m 1m 1m 2m
18	If $\vec{a},\vec{b},\vec{c}$ are coplanar then $[\vec{a}\ \vec{b}\ \vec{c}]=0$ $[\vec{a}+\vec{b}\quad \vec{b}+\vec{c}\quad \vec{c}+\vec{a}]=\{(\vec{a}+\vec{b})$ x $(\vec{b}+\vec{c})$ x $(\vec{c}+\vec{a})$ $=(\vec{a}$ x $\vec{b}).\vec{c}+(\vec{b}$ x $\vec{c}).\vec{a}$ $=2[\vec{a}\ \vec{b}\ \vec{c}]$ =2x0=0 Hence $\vec{a}+\vec{b}$ + $\vec{b}+\vec{c}$ + $\vec{c}+\vec{a}$ are coplanar	1m 2m 1m

19	Eqn of plane containing three points is 3x-4y+3z-19=0 Distance of the point from the plane is $\frac{6\sqrt{34}}{34}$ units	2m 2m
20	Point of intersection of two curves $(k^{\frac{2}{3}},k^{\frac{1}{3}})$ Slope of the curve xy =k ,m_1= $-\frac{k^{\frac{1}{3}}}{k^{\frac{2}{3}}}$ Slope of the curve y^2 =x .m_2 =$\frac{1}{2k^{\frac{1}{3}}}$ Since the curves cut at right angles m_1m_2 =-1 $8k^2=1$	1m 1m 1m 1m
21	I=$\int_0^{\frac{\pi}{4}} \log(1+tanx)\,dx$ BY P_4 I= I=$\int_0^{\frac{\pi}{4}} \log\left(\tan(\frac{\pi}{4}-x\right)dx$ =$\int_0^{\frac{\pi}{4}} \log\left(\frac{2}{1+\tan x}\right)dx$ I+I =$\int_0^{\frac{\pi}{4}} \log\left(\frac{2}{1+\tan x}\right)dx+\int_0^{\frac{\pi}{4}} \log(1+tanx)\,dx$ =$\int_0^{\frac{\pi}{4}} \log(2)\,dx$ =$\frac{\pi}{4}\,log2$ I=$\frac{\pi}{8}$log2 *OR* $I=\int_{-\pi}^{\pi}\frac{2x(1+sinx)dx}{1+cos^2x}$ $=\int_{-\pi}^{\pi}\frac{2Xdx}{1+cos^2x}+\int_{-\pi}^{\pi}\frac{2xsinxdx}{1+cos^2x}$ = 0 +2 $\int_0^{\pi}\frac{2xsinxdx}{1+cos^2x}$(First Integral is odd & second one is even) =4 $\int_0^{\pi}\frac{x(sinx)dx}{1+cos^2x}$ I_1 =$\int_0^{\pi}\frac{x(sinx)dx}{1+cos^2x}$ BY P_4,I_1 =$\int_0^{\pi}\frac{(\pi-x)(\sin(\pi-x)dx}{1+cos^2(\pi-x)}$ =$\int_0^{\pi}\frac{\pi-x(sinx)dx}{1+cos^2x}$ Adding 2 I_1 =$\pi\int_0^{\pi}\frac{(sinx)dx}{1+cos^2x}$ =$2\pi^2$ (Substitute cosx =u) I_1 =$\pi^2/4$ I=π^2	1m 1m 1m 1m 1m 1m 1m 1m
22	Let E_1 be the event that student knows the answer E_2 be the event that he guesses the answer E_3 be the event that he copies the answer P(E_1) =$\frac{1}{2}$,P(E_2) =$\frac{1}{4}$ P(E_3) =$\frac{1}{4}$ A be the event that answer is correct P($\frac{A}{E1}$) =1, P($\frac{A}{E2}$) =$\frac{1}{4}$ P($\frac{A}{E3}$) =$\frac{3}{4}$ BY Bayes theorem P($\frac{E1}{A}$) =$\frac{2}{3}$	1 1 1 1

<table>
<tr>
<td>23</td>
<td>Let X denote the random variable. $X = 0, 1, 2$ $n = 2, p = ¼, q = ¾$
<table>
<tr><td>x_i</td><td>0</td><td>1</td><td>2</td><td>Total</td></tr>
<tr><td>p_i</td><td>$^2C_0\left(\frac{3}{4}\right)^2 = \frac{9}{16}$</td><td>$^2C_1\frac{1}{4}\left(\frac{3}{4}\right) = \frac{6}{16}$</td><td>$^2C_2\left(\frac{1}{4}\right)^2 = \frac{1}{16}$</td><td></td></tr>
<tr><td>x_ip_i</td><td>0</td><td>6/16</td><td>2/16</td><td>1/2</td></tr>
<tr><td>$x_i^2p_i$</td><td>0</td><td>6/16</td><td>4/16</td><td>5/8</td></tr>
</table>
$\text{Mean} = \sum x_ip_i = \frac{1}{2}$
$\text{Variance} = \sum x_i^2p_i - \left(\sum x_ip_i\right)^2$
$= \frac{5}{8} - \frac{1}{4} = \frac{3}{8}$</td>
<td>½
M

2

½

½

½</td>
</tr>
<tr>
<td>24</td>
<td>(a,b) * (c,d) = (c,d) *(a,b)
*is not commutative

{(a,b) * (c,d) }* (e f)= (a,b) * {(c,d) * (e f)}
*is assosciative

(1,0) is the identity element

$(\frac{1}{a}, \frac{-b}{a})$ is the inverse element of (a,b),a≠ 0

OR

f (x) = $4x^2 + 12x + 15$

y= $4x^2 + 12x + 15$

g(y) $= \frac{\sqrt{y-6}-3}{2}$

(fog)y = y

(gof)x=x

Therefore f is invertible $f^{-1} = \frac{\sqrt{y-6}-3}{2}$</td>
<td>$1\frac{1}{2}$
m

$1\frac{1}{2}$
m
$1\frac{1}{2}$1
mm
$1\frac{1}{2}$
m

1m

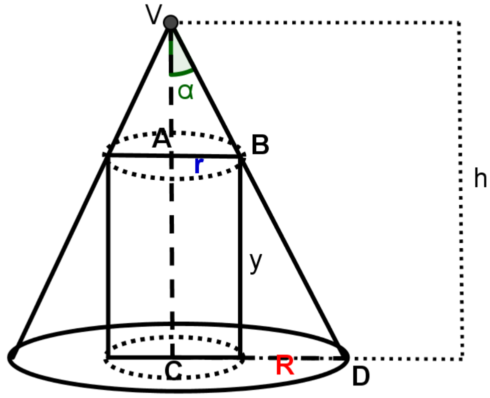
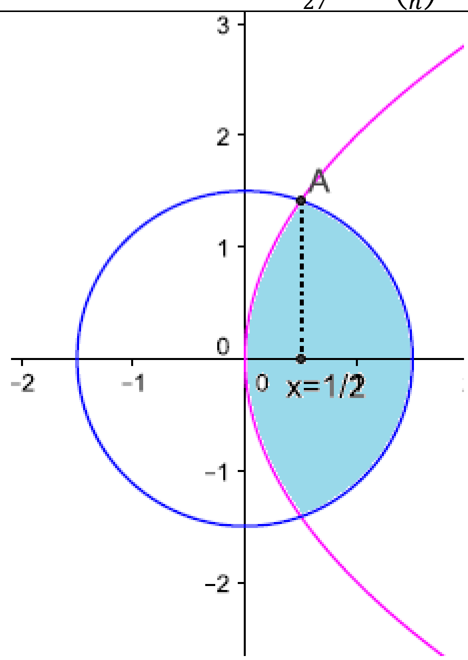
1m

2m

1m

1m</td>
</tr>
</table>

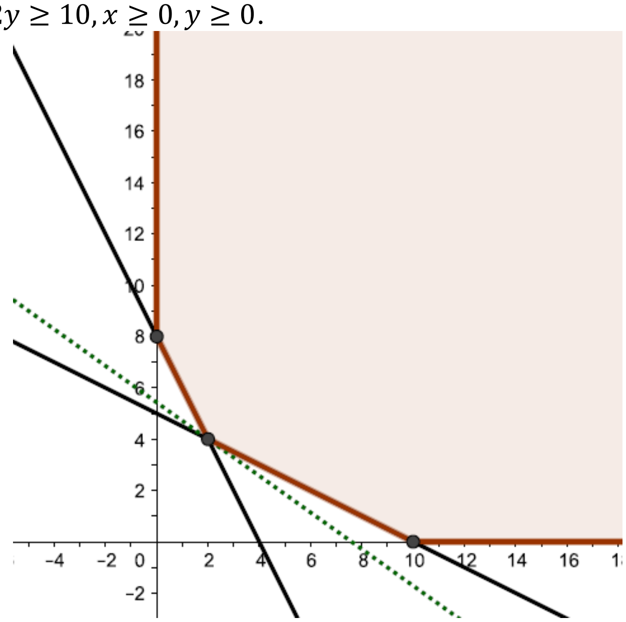
25	Equation of plane is x(1+3μ) +y(3-μ) + $4\mu z + 6 = 0$ $\frac{6}{\sqrt{[(1+3\mu)^2+(3-\mu)^2+(4\mu)^2]}}$ =1 $\mu = \pm 1$ Cartesian equation is 2x+y+2z+3=0Or-x+2y-2z+3=0 Vector equation is $\vec{r}.(2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}) + 3 = 0$ or$\vec{r}.(-\hat{\imath} + 2\hat{\jmath} - 2\hat{k}) + 3 = 0$	1m 2m 1m 1m 1m
26	20x +30y +40z=250 30x+40y+20z=220 40x+20y+30z=200 [Polythene=Re.1] [Handmade bag = Rs.5] [Newspaper's envelop=Rs.2] Shopkeeper A is better for environmental conditions. As he is using least no of polythene. Shopkeeper B is better for social conditions as he is using handmade bags (Prepared by prisoners). OR $A^{-1} = \begin{bmatrix} 2 & -3 & -1 \\ -1 & 2 & 1 \\ -2 & 4 & 1 \end{bmatrix}$ $X = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} A^{-1} = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & -3 & -1 \\ -1 & 2 & 1 \\ -2 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \end{bmatrix}$	1m 4m 1m 4 2
27	Let a be the side of the square & r be the radius of circle 4a +$2\pi r = k$ a=$\frac{k-2\pi r}{4}$ Combined area A= a^2 + πr^2 =$\left(\frac{k-2\pi r}{4}\right)^2$ $\frac{dA}{dr}$ =$-\left(\frac{k-2\pi r}{4}\right)\pi$ +$2\pi r = 0$ $\frac{dA}{dr} = 0$ r=$\frac{k}{2\pi+8}$ a=$\frac{2k}{2\pi+8}$ a=2r $\frac{d^2A}{dr^2} = 2\pi + \frac{\pi^2}{2} > 0$ Area is minimum OR	1m 1m 1m 1m 1m 1m

	 $$\Delta VAB \sim \Delta VCD \Rightarrow \frac{h-y}{h} = \frac{r}{R} \Rightarrow r = \frac{R}{h}(h-y)$$ If V be the volume of cylinder, $$V = \pi r^2 y = \pi \left(\frac{R}{h}(h-y)\right)^2 y \Rightarrow V = \pi \left(\frac{R}{h}\right)^2 (h^2 y - 2hy^2 + y^3)$$ $\frac{dV}{dh} = \pi \left(\frac{R}{h}\right)^2 (h^2 - 4hy + 3y^2).$ $\frac{dV}{dh} = 0 \Rightarrow h^2 - 4hy + 3y^2 = 0 \Rightarrow y = \frac{h}{3}.$ $\frac{d^2V}{dy^2} = -2\frac{\pi}{h}R^2 < 0.$ $\therefore$volume is maximum when height of cylinder is one third of height of cone. Maximum volume $\frac{4}{27}\pi h^3 \left(\frac{R}{h}\right)^2 = \frac{4}{27}\pi h^3 tan^2\alpha.$	1m 1m 1m 2m 1m 1m
28	 To find point of intersection of $y^2 = 4x$ and $4x^2 + 4y^2 = 9$ Required area $=2\{($ *Area under the parabola* $y^2 = 4x$ *between* $x =$	1 m 1m

$0 \,\&\, x = 1/2) + \ (\,Area\ under\ the\ circle\ 4x^2 + 4y^2 = 9\ between\ x = {}^{1}/_{2} \,\&\, x = {}^{3}/_{2}\,)\}$ 2m

$=2\left(\int_0^{1/2} 2\sqrt{x}\,dx + \int_{1/2}^{3/2} \sqrt{\frac{9}{4} - x^2}\right)$ dx $= \frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} + \frac{1}{3\sqrt{2}}$ square units 2m

29 Let x kg of food 1be mixed with y kg of food 2.
LPP is minimise $C = 50x + 70y$, subject to
$2x + y \geq 8, x + 2y \geq 10, x \geq 0, y \geq 0.$ 2



2

At	C
(0, 8)	Rs 560
(2,4)	Rs 380
(10.0)	Rs 500

1

In the half plane $50x + 70y > 380$ there is no point in common with feasible region. 1

Hence the minimum cost is `380.