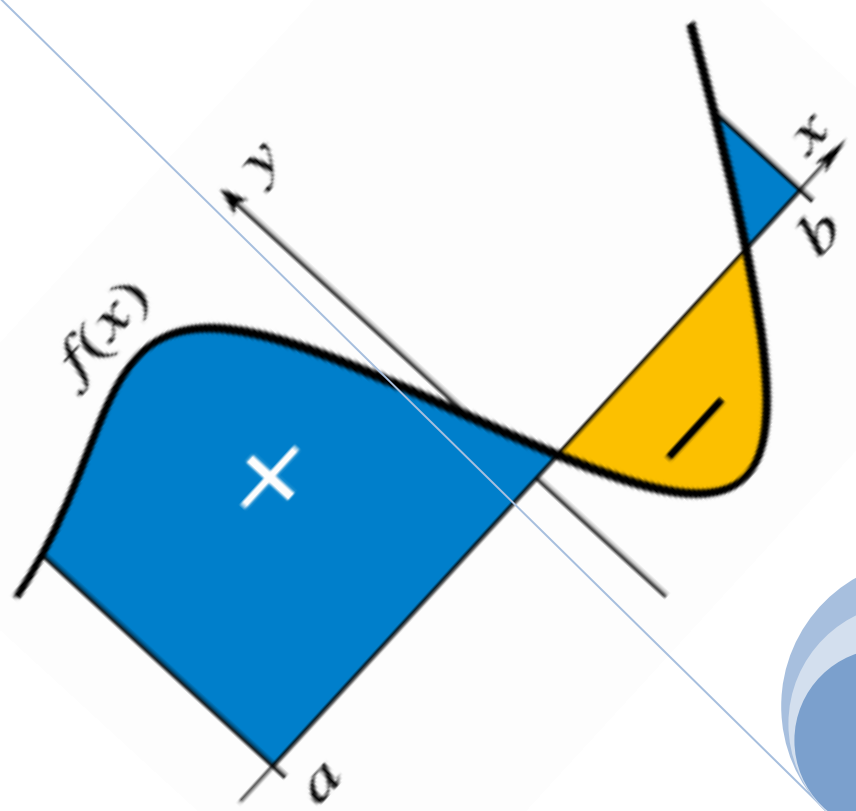
The only way to learn mathematics is to do mathematics.(Paul Halmos)



Model 5 sets
Question 2076B.S
Mathematics: XI

Department of Mathematics(GEMS)

3/12/2076

SET -1

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions:

(Group – A) **[5×3×2=30]**

1. a) If $A = [-3, 7]$ *and* $B = [-2,5)$, *then find* $A \cup B$ *and* $B - A$. .

   b) If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, prove that xyz=1.

   c) Test the symmetricity and periodicity of the function y = cos x .

2. a) Solve for the general values: $\tan^2 x = \sec x + 1$

   b) Using principle of mathematical induction, prove that $n^3 + 2n$ is divisible by 3.

   c) Test whether the matrix A=$\begin{bmatrix} 3 & 1 & 0 \\ -2 & 1 & -1 \\ -1 & 3 & -2 \end{bmatrix}$ is singular or not.

3. a) Solve by inverse matrix method ; 3x + y=7 and x - 5y = - 3

   b) If α *and* β be the complex cube roots of unity, then prove that

   $$\alpha^4 + \beta^4 + \alpha^{-1}\beta^{-1} = 0$$

   c) For what value of k will the equation $x^2+2(k+2)x+9k=0$ has equal roots.

4. a) Find the equation of straight line whose slope is $\frac{1}{3}$ and passes through the point of intersection of the lines y = x and y = -x.

   b) Find the equation of a circle with center at (1,-2) and touching the line x+y+5=0.

   c) Test the continuity of the function f(x) = $\frac{|x-5|}{(5-x)}$ at point x=5.

5. a) Find $\frac{dy}{dx}$ when y = $a\sec^2\theta$ and x = 2a tan θ .

   b) Integrate: $\int \frac{e^{-1/x}+1}{x^2}\,dx$

   c) Determine where the graph of $f(x) = x^4 - 8x^3 + 18x^2 - 24$ is concave upwards or concave downwards.

(Group –B) **[5×2×4=40]**

6. a) If x ∈ R and a be any positive real number, prove that

   $|x| < a \Rightarrow -a < x < a$ and conversely.

   OR

   Define symmetric difference of two sets. Prove that:

   $A \Delta B = (A \cup B) - (A \cap B)$

   b) Sketch the graph of the function y = (x-1)(x-2)(x-3) indicating its different characteristics.

7. a) If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z = \pi$, show that $x^2+y^2+z^2+2xyz=1$.

   OR

   In any triangle ABC, Prove that :

   $$\cot\frac{1}{2}(B-A) = \frac{1+m\cos B}{m\sin B} \; if \;\; b - a = mc .$$

   b) Prove that: $\begin{vmatrix} x^2+1 & xy & xz \\ xy & y^2+1 & yz \\ xz & yz & z^2+1 \end{vmatrix} = 1 + x^2 + y^2 + z^2$

8. a) Solve the following system of equations by Row equivalent matrix method or inverse matrix method:

   $$2x - y + 4z = -3$$
   $$x - 4z = 5$$
   $$6x + y + 2z = 10$$

   b) Find the condition that the quadratic equations $a^2+bx+c=0$ and $a'x^2+b'x+c'=0$ may have a common root. Also find the condition that both equations may have two common roots.

9. a) Find the condition that the line y=mx+c to be the tangent to the circle $x^2+y^2=a^2$. Also find the equation of the tangent.

   b) Define continuity of a function at a point. Test the continuity of a function

   $$f(x) = \begin{cases} 3+2x & for -3/2 \le x < 0 \\ 3-2x & for\ 0 \le x < 3/2 \\ -3-2x & for\ x \ge 3/2 \end{cases} \quad at \;\; x = 0.$$

   OR

Evaluate: $\lim_{x \to 0} \dfrac{(a+x)\sec(a+x) - a\sec a}{x}$

10. a) Find, from first principle, the derivative of $\sqrt{\sin 2x}$.

b) Find the area of region between the curves $y^2 = 4ax$ and $x^2 = 4ay$ by using the method of integration.

(Group – C) [5×6=30]

11. Define one to one and onto function. Let $f: R - \{2\} \to R - \{3\}$ be defined by $f(x)=\frac{3x}{x-2}$. Show that f is bijective . Also , find f^{-1}.

12. A, G and H be the arithmetic , geometric and harmonic means of two numbers a a and b, then prove that : i) $A.H= G^2$ and ii) A>G>H

13. Find the length of perpendicular from the point (x_1, y_1) to a line $x\cos\alpha + y \sin\alpha = p$. Find the distance between the lines 2x-5y=6 and 6x-15y+11=0.

OR

Prove that the straight lines joining the origin to the point of intersection of the line $\frac{x}{a} + \frac{y}{b} = 1$ and the curve $x^2+y^2=c^2$ are at right angle if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{2}{c^2}$.

14. State De-moivre's theorem. Use it to find the cube roots of i .

15. What are the criteria for a function y = f(x) to have the local maxima and local minima at a point. Show that the rectangle of largest possible area for a given perimeter is a square.

OR

Two concentric circles are expanding in such a way that the radius of the inner circle is increasing at the rate of 8 cm/sec and that of the outer circle at the rate of 5 cm/sec. At a certain time, the radii of the inner and the outer circles are respectively 24cm and 30cm. At that time is the area between the circles increasing or decreasing? How fast?

End of set

SET - 2

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions:

(Group – A) [5×3×2=30]

1. a) What is a tautology? Prove that $\sim (p \wedge (\sim p))$ is a tautology.

b) If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, prove that $x^x . y^y . z^z = 1$.

c) Test the symmetricity and periodicity of the function f(x) = tan x/4. Also find the period .

2. a) Find the value of $\cos\left(\sin^{-1}\frac{4}{5} + \tan^{-1}\frac{5}{12}\right)$

b) Find the sum of infinite seires: $3 + \sqrt{3} + 1 + \cdots \ldots \ldots$

c) Find the adjoint matrix of the matrix $\begin{bmatrix} 3 & 2 \\ 1 & -5 \end{bmatrix}$.

3. a) Solve by row –equivalent method: 2x – y = 5 ; 2x + 7y = -3.

b) Define conjugate of a complex number. If Z and W be any two complex numbers , prove that : $\overline{ZW} = \overline{Z} \,.\, \overline{W}$.

c) Determine the value of m for which the equations $3x^2+ 4mx+2=0$ and $2x^2+3x-2=0$ have a common root.

4. a) Do the points (-1, 2) and (3 -2) lie on the same side of the straight line x+3y=6?

b) Find the equation of tangent to the circle $x^2 + y^2= 5$ which are perpendicular to the line x+2y = 0.

c) Evaluate: $\lim_{x \to a} \dfrac{\sqrt{2x} - \sqrt{3x-a}}{\sqrt{x} - \sqrt{a}}$

5. a) Find the derivative $\frac{dy}{dx}$ *if* $y = \dfrac{1}{x - \sqrt{a^2 + x^2}}$.

b) Find the area bounded by the curve y = sin x , x = 0 and x = π .

c) The radius of a spherical air bubble is increasing at the rate of 0.8 cm/sec. At what rate is the volume of the bubble increasing when the radius is 2 cm?

(Group –B) **[5×2×4=40]**

6. a) State and prove De-Morgan's laws for any two sets.

OR

Define absolute value of a real number. If x and y be any real number, then prove that : $|x+y| \le |x|+|y|$. Also solve: $|2x+1| \le 3$ and draw the graph of the inequality.

b) Sketch the graph of y = sin x ($-\pi \le x \le \pi$) indicating its different characteristics.

7. a) Solve for general values: $2\sin^2 x + \sin^2 2x = 2$.

OR

If $a^4 + b^4 + c^4 = 2c^2(a^2 + b^2)$, prove that $\angle C = 45^\circ$ or 135°.

b) Without expanding the determinants, prove that:

$$\begin{vmatrix} 1 & bc & b+c \\ 1 & ca & c+a \\ 1 & ab & a+b \end{vmatrix} = \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$

8. a) Use inverse matrix method or Cramer's rule to solve the system:

$$x - 2y - z = -7$$
$$2x + y + z = 0$$
$$3x - 5y + 8z = 13$$

b) If α and β are the roots of the equation $x^2 - px + q = 0$, find the quadratic equation whose roots are $\alpha^2\ \beta^{-1}$ and $\beta^2\ \alpha^{-1}$.

9. a) If the line $lx + my = 1$ touches the circle $x^2+y^2= a^2$, prove that the point (l,m) lies on a circle whose radius is $\frac{1}{a}$.

b) Evaluate: $\lim_{\theta \to \frac{\pi}{4}} \frac{\cos\theta - \sin\theta}{\theta - \pi/4}$

OR

A function f(x) is defined as follows

$$f(x) = \begin{cases} 2x+1 & for \quad x < 1 \\ 2 & for \quad x = 1 \\ 3x & for \quad x > 1 \end{cases}$$

Is the function continuous at x=1 ? If not can you make f(x) continuous at x=1 ?

10. a) Find, from the first principle , the differential coefficient of $\cos^2 x$.

b) Find the area of circle $x^2+y^2 = 25$ by using method of integration.

(Group – C) **[5×6=30]**

11. Define domain and range of a function. Find the domain and range of the function $y = \sqrt{21 - 2x - x^2}$.

12. Deduce the formula : $1^2 + 2^2 + 3^2 + \cdots \ldots \ldots \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

13. The origin is a corner of a square and two of its sides are y + 2x = 0 and y + 2x = 3.Find the equation of the other two sides.

OR

If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, prove that:

i) $\frac{a}{h} = \frac{h}{b} = \frac{g}{f}$

ii) The distance between them is $2\sqrt{\frac{g^2 - ac}{a^2 + ab}}$.

14. Define a complex number. Find the square roots of the complex number 3 – 4i .

15. What are the criteria for a function y = f(x) to have the local maxima and local minima at a point. Find the maximum value and minimum value of the function f(x) = $2x^3 – 9x^2 – 24x + 3$. Also, find the point of inflection.

OR

Water flows into an inverted conical tank at the rate of $42 cm^3$/sec. When the depth of the water is 8 cm ,how fast is the level rising ?Assume that the height of the tank is 12cm and the radius of the top is 6cm.

End of set

SET - 3

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions:

(Group – A) **[5×3×2=30]**

1. a) If P and q be any two simple statements show that $\sim(p \vee (\sim q)) \equiv (\sim p) \wedge q$

   b) If f: R $\rightarrow$ R be defined by f(x) = 3x -6, find f^{-1}.

   c) Test the periodicity of the function f(x) = sin(ax+b).Also find its period.

2. a) Solve $\sqrt{3}\,sinx - cosx = \sqrt{3}\ f$ or $0 \le x \le 2\pi$

   b) Using principle of mathematical induction prove that :

   $2+2^2+2^3+\ldots\ldots\ldots\ldots\ldots 2^n = 2(2^n-1)$

   c) Find the inverse of $\begin{bmatrix} 3 & 2 \\ -5 & -3 \end{bmatrix}$.

3. a) Solve by cramer's rule : $3x+\frac{4}{y}=10$, $-2x+\frac{3}{y}=-1$

   b) If $\bar{z}$ be the conjugate of the complex number z, prove that roots of the complex number z, prove that $Arg(\bar{z}) = 2\pi - Arg(z)$.

   c) If the roots of the equation $lx^2+nx+n=0$ be in the ratio p:q, find the value of $\sqrt{\frac{p}{q}}+\sqrt{\frac{q}{p}}$.

4. a) Find the equation of the line through (4,2) which is parallel to the line x-2y-4=0.

   b) Find the equation of circle whose centre is the point of intersection of x+2y -1 = 0 and x – y- 7 = 0 and which passes through (3, 1)

   c) Evaluate: $\lim_{x \to 0}$ x sin $\frac{1}{x}$

5. a) Find the derivative of x^{e^x}

   b) Integrate : $\int \frac{dx}{x\sqrt{x^2-a^2}}$

c) Show that the function $f(x) = 2x^3-24x+15$ is increasing at x=3 and decreasing at $x = 3/2$.

(Group –B) **[5×2×4=40]**

6. a) Define a tautology and a contradiction. prove that $(p \wedge q) \wedge \sim(p \vee q)$ *is a contradiction.*

   OR,

   State and prove De-morgan's laws.

   b) Sketch the graph of $y = cosx \ \ (-\pi/2 \le \pi/2)$

7. a) Prove that: $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3 = \pi = 2(\tan^{-1} 1 + \tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3})$

   OR

   State and prove cosine law.

   b) Prove that : $\begin{vmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{vmatrix} = 3abc - a^3 - b^3 - c^3$

8. a) Use inverse matrix method or row equivalent method, to solve the system .

   $6y + 6z = -1$

   $8x + 6z = -1$

   $4x + 9y = 8$

   b) if the quadratic equations $x^2+px+q=0$ and $x^2+qx+p=0$ have a common root , prove that either p=q or p+q+1=0.

9. a) Show that the line $\frac{x}{a}+\frac{y}{b}=1$ will be tangent to the circle.

   $(x-a)^2 + (y-b)^2 = r^2$ if $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{r^2}$

   b) Evaluate: $\lim_{\theta \to \frac{\pi}{4}} \frac{cos\theta - \sin\theta}{\theta - \pi/4}$

OR

A function *f*(x) is defined as follows :

$f(x)=\begin{cases} x\sin\frac{1}{x} & for\ \ x\neq 0 \\ 0 & for\ \ x=0 \end{cases}$ show that f(x) is continuous at x=0.

10. a) Find ,from the first principle differential coefficient of $\sin^2 3x$.
    b) Find the area bounded by the curve $y = log\ (1+x)$ $X-axis$ and the ordinates $x = 0\ \ and\ \ x = 1$.

(Group – C) **[5×6=30]**

11. Define domain and range of a function. Find the domain and range of the function

$$y = \sqrt{x^2 - 2x - 8}$$

12. Find the sum of n- terms of the series. $1.2.3 + 2.3.4 + 3.4.5 + \ldots\ldots\ldots$
13. Prove that the equation of the straight line which passes through the point (a $\cos^3\theta$, a $\sin^3\theta$) and perpendicular to the straight line $x\ sec\theta + y\ cosec\ \theta = a$ is $xcos\theta - ysin\theta = a\ cos\ 2\theta$.

OR.

Find the equations of the two lines represented by the equation $2x^2+3xy+y^2+5x+2y-3=0$. Find their points of intersection and angle between them .

14. State and prove De- Moivre's theorem. Use it to evaluate $(-1+i)^{14}$
15. A man who has 144 m of fencing material wishes to enclose a rectangular garden. Find the maximum area he can enclose.

OR

If the area of a circle increase at a uniform rate prove that the rate of increase of the perimeter varies inversely as the radius.

End of set

SET - 4

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions:

(Group – A) **[5×3×2=30]**

1. a) Define negation of a statement. Show that the compound statement pv (~ (p∧q) is a tautology.
   b) Prove that: $x^{(logy-logz)}.y^{(logz-logx)}.z^{(logx-logy)} = 1$
   c) Test the periodicity and symmetricity of the function: *y = sin2x*

2. a) Solve: $Sinx - Cosx = \sqrt{2}$
   b)Using principle of mathematical induction, prove that:
   $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots\ldots\ldots\frac{1}{2^n} = 1 - \frac{1}{2^n}$
   c) Given $A=\begin{bmatrix}1 & 3\\ 3 & 2\end{bmatrix}$ and B= $\begin{bmatrix}2 & 1\\ 2 & 3\end{bmatrix}$ show that $(A+B)^T = A^T + B^T$

3. a) Solve the following equations by using Cramer's rule:
   2x + 5y = 7
   5x + 2y = -3

   b) If $\alpha = \frac{1}{2}(-1+\sqrt{-3})$and $\beta = \frac{1}{2}(-1-\sqrt{-3})$. Show that $\alpha^4 + \alpha^2\beta^2 + \beta^4 = 0$
   c) Form the equation whose roots are the reciprocals of the roots of:
   $ax^2 + bx + c = 0$

4. a) Find the distance between the two parallel lines
   3x – 4y + 1 = 0 and 3x – 4y + 26 = 0

   b) Find the equation of a circle whose two of the diameter are x+y=6 and x+2y=8 and radius 10 units.
   c) Evaluate: $\lim_{x\to\infty}\sqrt{x}(\sqrt{x} - \sqrt{x-3})$

5. a) Find $\frac{dy}{dx}$ when $y = t + \frac{1}{t}$ and $x = t - \frac{1}{t}$.

b) Find the interval in which the function f(x) = $2x^2 - 3x + 7$ is increasing or decreasing.

c) Evaluate: $\int \frac{dx}{1+Sinx}$

(Group –B) **[5×2×4=40]**

6. a) Define difference of two sets. If A, B and C are any three non-empty subsets of a universal set U, prove that:

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

OR

Let A = [-3,1] and B = [-2,4). Find $A \cup B$, $A \cap B$, A – B and B – A

b) Draw the graph of the function y = $x^2 - 4x + 3$ using its different characteristics.

7. a) State and prove sine law.

OR

State Sine law. Prove that, $\tan\frac{1}{2}(C-A) = \frac{c-a}{c+a} \cdot \text{Cot}\frac{B}{2}$

b) Prove that: $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix} = (y-z)(z-x)(x-y)(xy+yz+zx)$

8. a) Using row equivalent method or inverse matrix method, solve the following equations.

$$x + y + z = 6$$
$$x - y + z = 2$$
$$2x + y - z = 1$$

b) If one root of the equation $ax^2 + bx + c = 0$ be the square of the other, prove that$b^3 + a^2c + ac^2 = 3abc$

9. a) Find the equation of tangent to the circle $x^2 + y^2 - 4x + 10y + 4 = 0$ which is perpendicular to the line 3x – 4y = 18.

b) Evaluate: $\lim_{x\to\theta} \frac{xCot\theta - \theta Cotx}{x-\theta}$

OR

A function f(x) is defined as follows:

$$f(x) = \begin{cases} 2x+1 & for\ x < 1 \\ 2 & for\ x = 1 \\ 3x & for\ x > 1 \end{cases}$$

Is the function continuous at x = 1? if not, can it be made continuous at x = 1?

10. a) Find, from first principles, the derivative of $\frac{1}{\sqrt{2-3x}}$

b) Find the area between the curve $y^2 = 4ax$ and the line x = a.

(Group – C) **[5×6=30]**

11. Define a composite function. Let $f: R \to R$ *and* $g: R \to R$ be two functions defined by $f(x) = 2x^2 - 3$and $g(x) = 3x + 2$. Determine $fog(x), gof(x)$ and $gog(x)$.Is$fog(x) = gof(x)$? Are the functions $fog(x)$ *and* $gog(x)$ one to one?

12. Find the sum of n terms of the series $3.1^2 + 4.2^2 + 5.3^2$+ .....

13. Find the equations of the bisectors of the angles between the lines 4x – 3y + 1 = 0 and 12x – 5y + 7 = 0. And prove that the bisectors are at right angles to each other.

OR

Prove that the bisectors of the angles between the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ is $\frac{x^2 - y^2}{xy} = \frac{a-b}{h}$

14. State De-Moivre's theorem. Use it to solve the equation: $z^4 + 1 = 0$

15. List the criteria for the function y = f(x) to have the local maxima and local minima at a point? Find the local maxima and local minima of the function *f(x)* = $4x^3 - 15x^2 + 12x + 7$. Also find the point of inflection.

OR

A point is moving along the curve y=$2x^3 - 3x^2$ in such a way that its x-coordinate is increasing at the rate of 2cm/sec. find the rate at which the distance of the point from the origin is increasing when the point is at (2,4).

End of set

SET - 5

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions:

(Group – A) **[5×3×2=30]**

1. a) Prepare a truth table for the compound statement pv (~ (p∧q)). What would you conclude from the truth table.
   b) Find the domain and range of the function $y = \sqrt{x-2}$.
   c) Examine whether the function $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$ is even, odd or neither.Also test for its symmetricity.
2. a) prove that :$\cos(\sin^{-1} a + \cos^{-1} b) = b\sqrt{1-a^2} - a\sqrt{1-b^2}$
   b)Using principle of mathematical induction, prove that:
   $$2 + 5 + 8 + \cdots \ldots\ldots\ldots\ldots\ldots + (3n-1) = \frac{n(3n+1)}{2}$$
   c) Given $A = \begin{bmatrix} 1 & 3 \\ 3 & 2 \end{bmatrix}$ and B= $\begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$ show that $|AB| = |A||B|$.
3. a) Solve the following equations by using Cramer's rule:
   x + 5/y = 7
   2/y +5x = -3
   b) If ω be a complex cube root of unity, show that: $(1-\omega+\omega^2)^4 + (1+\omega-\omega^2)^4 = -16$
   c) Form the quadratic equation whose one root is $2+\sqrt{3}$.
4. a) Find the equations of the bisectors of the angles between the lines x=2y and 11x+6=2y.
   b) prove that the line 5x+12y+78=0 is tangent to the circle $x^2+y^2=36$.
   c) Evaluate: $\lim_{x\to 0} \frac{1-\cos px}{1-\cos qx}$
5. a) Find $\frac{dy}{dx}$ when x+y =siny.
   b) Show that the function f(x) = x^2 – 3x + 4 is increasing at the point x=2 and is decreasing at the point x=1.
   c) Evaluate: $\int \frac{1}{x}\sin(\log x)\, dx$

(Group –B) **[5×2×4=40]**

6. a) Define union and intersection of two sets. If A, B and C are any three non-empty subsets of a universal set U, prove that:
   A ∪ (B ∩ C) = (A∪B) ∩ (A ∪ C)
   OR
   Define absolute value of a real number. For any two real numbers x and y, prove that : $|x+y| \le |x| + |y|$.
   b) Sketch the graph of $y=2^x$, indicating its characteristics.
7. a) Solve : tanax = cotbx
   OR
   State and prove the cosine law in any triangle.
   b) Prove that: $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$
8. a) Using row equivalent method or inverse matrix method, solve the following equations.
   x + y +z = 1
   x+2y+3z = 4
   x +3y+7z =13
   b) If the roots of $ax^2 + cx + c = 0$ are in the ratio of m:n, prove that:
   $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} + \sqrt{\frac{c}{a}} = 0$
9. a) Prove that the tangents to the circle $x^2+y^2+4x+8y+2=0$ at the points (1,-1) and (-5,-7) are parallel.
   b) Evaluate: $\lim_{x\to c} \frac{\sin x - \sin c}{\sqrt{x}-\sqrt{c}}$
   OR
   A function f(x) is defined as follows:
   $$f(x) = \begin{cases} 2-x^2 & for\ x < 2 \\ 3 & for\ x = 2 \\ x-4 & for\ x > 2 \end{cases}$$
   Is the function continuous at x = 2? if not, can it be made continuous at x = 2?
10. a) Find, from first principles, the derivative of $\frac{1}{2x+3}$.

b) Using integration, find the area of an ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$.

(Group – C) [5×6=30]

11. When does a function become bijective? A function $f:R\to R$ is defined by $f(x)=x^3-1, x\epsilon R$.Examine whether f is one to one and onto or not.Also find its inverse if it exists.

12. Find the sum of infinite terms of the series : $\frac{3}{5}+\frac{7}{5^2}+\frac{11}{5^3}+\frac{15}{5^4}+\cdots\ldots\ldots\ldots\ldots\ldots\ldots$

13. Find the condition that the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ may represent a pair of straight lines .

OR

Prove that the straight lines joining the origin to the point of intersection of the line $\frac{x}{p}+\frac{y}{q}=1$ and the curve $x^2+y^2=r^2$ are at right angles if $\frac{1}{p^2}+\frac{1}{q^2}=\frac{2}{r^2}$.

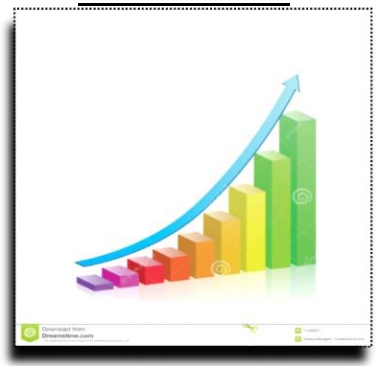
14. State De-Moivre's theorem and use it to find the cube roots of unity. Verify that the sum of the three cube roots of unity is zero.

15. Find the absolute maxima and minima of the function $f(x)=2x^3-15x^2+36x+10$ on [1,4]. Also,find the point of inflection.

OR

If the volume of the expanding cube is increasing at the rate of $24cm^3/min$, how fast is its surface area increasing when the surface area is $216cm^2$?

Best of Luck



The only way to learn mathematics is to do mathematics.(Paul Halmos)

Chapterwise Marks Division

S.N.	NAME OF CHAPTERS	MARKS
1.	*Sets, Real Number System and Logic*	2+4
2.	*Relations ,Functions and Graphs*	2+6
3.	*Curve Sketching*	2+4
4.	*Trigonometry*	2+4
5.	*Sequence and Series*	2+6
6.	*Matrices and Determinants*	2+4
7.	*System of Linear Equations*	2+4
8.	*Complex Numbers*	2+6
9.	*Polynomial Equations*	2+4
10.	*Coordinate Geometry*	2+6
11.	*Circle*	2+4
12.	*Limits and Continuity*	2+4
13.	*The Derivatives*	2+4
14.	*Application of Derivatives*	2+6
15.	*Antiderivatives and its Applications*	2+4
	Total	**100**

GROUP A : 2 MARKS(15Q)
GROUP B: 4 MARKS(10Q)
GROUP C: 6 MARKS (5Q)
ALTOGETHER:30QUESTIONS

IN GROUP B, 4 OR QUESTIONS FROM ANY 4 CHAPTERS: USUALLY ,FROM CHAPTERS 1,4,7 AND 12.

IN GROUP C. 2 OR QUESTIONS FROM ANY 2 CHAPTERS : USUALLY, FROM CHAPTERS 10 AND 14.