GOVERNMENT OF KARNATAKA

DEPARTMENT OF SCHOOL EDUCATION (PRE-UNIVERSITY)

REVISED QUESTION BANK (2024-25)

SUBJECT
BASIC MATHEMATICS (75)

FIRST YEAR PUC

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The revised Question Bank for 2024–25 has been prepared in adherence to the syllabus prescribed by the Pre-University Board of Karnataka. The objective of this Question Bank is to serve as a comprehensive tool that enhances students' understanding and preparation for examinations. A great deal of effort has been put into making this question bank a valuable resource for students.

To assist students, questions are organized chapter-wise. They are divided into one-mark, two-mark, three-mark, four-mark and five-mark categories. Under the one-mark section, both multiple-choice questions and very short answer types (VSA) are included, in compliant with the latest blueprint.

By providing a wide range of questions and structured content, this question bank aims to facilitate effective study habits and reinforce key concepts. We hope that students will leverage this resource to boost their confidence and achieve academic success. Students are encouraged to utilize this question bank to the fullest.

Wishing all students the best in their studies!

Chapter 1: NUMBER THEORY

One Mark Questions:

1. Define a Prime number.
2. What is a Composite number?
3. Define a Complex number.
4. What is the conjugate of the complex number Z = a + ib?
5. Write the formula to find the sum of all positive divisors of a composite number 'n'.
6. Find the number of positive divisors of the following numbers:
    a) $3^4 \times 5^3 \times 7^2$
    b) 672
    c) 768
    d) 96
    e) 360
    f) 156

7. Write the canonical representation of the following:
    a) 140
    b) 306
    c) 1024
    d) 4896
    e) 1644
    f) 825

Answer The Following Multiple Choice Questions:

8. The real and imaginary parts of the complex number 3+5i respectively are

    a. 3, i b. 1, 5 c. 3, 5 d. 5, 3

9. The real and imaginary parts of the complex number 4-i respectively are

    a. 4, -1 b. 4, -i c. 4, i d. 4, 1

10. The imaginary part of the number is

a. 0 b. 6 c. 1 d. $\frac{1}{6}$

11. The imaginary part of the complex number $\frac{2}{3} - \frac{4i}{5}$ is

a. $\frac{2}{3}$ b. $\frac{4}{5}$ c. $\frac{-4}{5}$ d. $\frac{-4i}{5}$

12. The conjugate of Z = 2+3i is

a. -2+3i b. -2-3i c. 2-3i d. $\frac{1}{2+3i}$

13. The value of Z_1+Z_2 when Z_1=2+3i and Z_2=1-i is

a. 3+2i b. 3+4i c. 1+2i d.3-2i

Two Marks Questions:

1. Find the LCM of the following by factorization method:
   i. 6,9,12
   ii. 12, 14, 16
   iii. 16, 20, 24
   iv. 6, 9, 12
   v. 4, 12, 24
   vi. 36, 40, 48
2. Find the LCM using division method:
   i. 72, 64
   ii. 48, 96, 72
   iii. 25, 75, 150
   iv. 60, 80, 100
   v. 12, 15, 18
3. Find the HCF using factorization method:
   i. 165, 225
   ii. 108, 216
   iii. 60, 72, 84
   iv. 55, 210

4. Find the HCF using division method:
    i. 144, 720
    ii. 45, 90, 180
    iii. 12, 15, 24
    iv. 104, 130
    v. 165, 225, 435
5. Find the number which when divided by 16,20 and 40 leaves the same remainder 5.
6. Find the number which when divided by 36,40 and 48 leaves the same remainder 5.
7. Three bells toll at intervals 30sec, 40 sec and 50 sec respectively. After how many minutes will the next bell be if they all start to toll together?
8. Find the largest integer which divides 105 and 315.
9. Find the greatest integer which divides 42, 52 and 86 leaving remainders 6, 4 and 2 respectively.
10. The HCF of two numbers is 16 and their LCM is 160. If one of the number is 64 find the other number.
11. If the product of two numbers is 216 and their LCM is 36, find their HCF.
12. If the HCF two numbers is 42 and their product is 52920, find their LCM.

Three Marks Questions:

1. Find the HCF of $\frac{8}{9}, \frac{32}{81}, \frac{16}{27}$.
2. Find the LCM of:
    a) $\frac{1}{3}, \frac{5}{6}, \frac{2}{9}$
    b) $\frac{6}{7}, \frac{5}{14}, \frac{8}{21}$
3. Prove that $\sqrt{2}$is an irrational number.
4. Prove that $\sqrt{5}$is an irrational number.

Five Marks Questions:

Find the number of all positive divisors and sum of all positive divisors of the following:

a) 960

b) 6498

c) 1026

d) 39744

e) 5005

f) 768

g) 1644

h) 4896

Chapter 2: SETS, RELATIONS AND FUNCTIONS

One Mark Questions:

1. If the set A has 5 elements , how many elements will P(A) have?
   a) 32 b) 25 c) 10 d) none of these
2. If A = {1,2} and B= {a,b} then find B - A
   a) {1,2} b) { } c) {a,b} d) {1,2,a,b}
3. If A = {1} and B= {2} then find B x A
   a) {1,2} b) { } c) {(1,2)} d) {(2,1)}
4. If A = {3,4} and B= {a,b} then find B U A
   a) {3,4,a,b} b) { } c) {(a, b), (3,4)} d) {a,b}
5. If U= {1,2,3,4,a,b,c} ,A = {1,2, a,b,4 } and B= {a,b,c} then find the complement of A
   a) {3,c} b) { } c) {a,b,c} d) {1,2,a,b,4}
6. Write the roster form of the statement " A= { x/ x is a letter of the word ENGINEERING}
7. If f: R→R is defined by f(x) = 3x-5 then find f(3)
8. If A = {1,2, 5,3,4} and B= {1,2,3,4} then find a relation R from A to B defined by
   R= {(x, y): y = 2x+1}
9. If R = {(a,b),(1,2),(3,4)} then find R^{-1}
10. Define an equivalence relation .
11. Represent " Set of prime numbers less than 15" in rule method
12. Which is a set
    a) A collection of all good films
    b) a collection of natural numbers between 2 and 10
13. If A= $\{a, b, \}$ then write all the subsets of A
14. If A = {1,4,3} and B= {4,5,7} then find B∩ A
15. If (2x, 4) = (8,4) find the value of x
16. If A and B are two sets such that A ⊂ B then find A∩B
17. If A = {1,2,3,4,5,6.7} and B= {2,4,6,8,10} C ={4,6,7,8,9,10} then find B∩ A∩C
18. If A ={1,2,3,4,5,6,7,8,0} then find the cardinal number of A
19. If A = {1,4} and B= {4,5} then find AΔB

20. If U is the universal set ,U ={1,2,3,4……10} and B ={1,2} then find the complement of (B)'

Two Mark Questions:

1. If A={2,3} and B ={3,4} find the number of relations that can be defined from A to B
2. If A= $\{a, b, c, d\}$ and B = $\{d, e, f, g\}$ then find (A-B) x A
3. If (x +y , x-y) = (5,2) then find the values of x and y
4. If U= $\{a, b, c, d, e, f, g\}$ and A= $\{a, b, c\}$ B = $\{b, d, f, g\}$ find (A$\cap$B)'
5. If A = {1,3,5,7,9} B = {2,4,6,8,10,12} . Define a function F: A$\rightarrow$B by f(x)=x+1 for every x$\in$A. Find the domain and the range of the function
6. If f(x) = x-1 and g(x) = $2x^2$ -3 find fog(2) and gof(1)
7. If A = {3,5,7} and B = {5,7,9} find AUB
8. If A x B = { (-1,1), (2,5), (4,7)} find A and B
9. If X and Y are two sets such that XUY has 50 elements, X has 28 elements and Y has 32 elements then how many elements does X$\cap$Y have?
10. If f(x) = x^2 then find the value of $\frac{f(3)-f(2)}{3-2}$

Three Mark Questions:

1. A relation R on a collection of set of integers defined by R= { (x,y): x-y is a multiple of 3} Show that R is an equivalence relation on Z.
2. Show that the relation " is congruent to " is an equivalence relation on a set of triangles.
3. Let A={1,2,3,4} , B= {3,5,6} and C= {5,6,7,8} Verify that
   $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
4. In a group of 65 people, 40 were found to like Cricket, 10 like Hockey and Cricket both. How many like Cricket only and not Hockey? How many like Hockey?
5. Given A = {2,4,6,8} and R = { (2,4), (4,2), (4,6), (6,4)} Show that the given relation is not reflexive , symmetric and not transitive
6. If n(U) = 700, n(A)= 200 and n(B) = 300 and n(A$\cap$B) =100. Find n(A'$\cap$B')

7. Let N be the set of natural numbers such that R== { (x,y): y = 4x+5 , x,y $\in$ N } Write the relation in roster form and find the domain and the range of the relation
8. Let f= { (1,4), (4,5), (5,6)} be a function from Z to Z where Zis the set of integers defined by f(x) = ax +b where a and b are integers. Find the values of a and b
9. Find the domain and the range of the function f(x) = $\frac{2x+1}{x-3}$, x $\in$ N
10. Given A = {5,4,6,7} and R = { (6,7), (7,7), (5,6), (4,4)} Represent the relation by a diagram

Five Mark Questions:

1. In a survey it was found that 31 people like the product A and 36 liked the product B and 39 liked the product C. If 24 people liked the product A and B , 22 liked the product C and A , 24 people liked the product B and C , 18 liked all the three products , then find the number of people who liked C only? Represent the result using Venn Diagram.
2. In a certain college with 500 students, 300 take milk and 250 tea. Find how many take
   a) milk only
   b) tea only
   c) both milk and tea
   d) atleast one of the two drinks. Represent the result using Venn Diagram
3. In a survey of 400 people in a school, 100 were listed as apple juice, 150 taking orange juice and 75 taking both the juices. Find how many students were taking
   a) neither apple juice nor orange juice
   b) only apple juice
   c) orange juice
   d) atleast one of the juices .
   Represent the details using venn diagram
4. Out of 250 people, 160 drink coffee, 90 drink tea , 85 drink milk and 45 drink coffee and tea, 35 drink tea and milk , 20 drink all the three. Find how many drink coffee and milk ? Represent the given detail using Venn diagram

5. In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 8 read magazine A and B, 10 read magazine A and C, 5 read magazines B and C while 3 read all the three magazines. Find the number of people who read none of the 3 magazines and also find how many read only magazine C. Represent the result using Venn Diagram.
6. Out of 500 car owners investigated, 400 owned Maruthi Car and 200 owned Hyundai car, 50 owned both cars. Is this data correct? Justify the answer
7. A college awarded 38 medals in Football, 15 in Basket ball and 20 in Cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports
8. Out of 85 students of class 1 PU, who took up a combined test in English and Hindi, 63 students passed in both and 12 failed in English. 4 failed only in English, Use Venn diagram to find out how many a) failed in Hindi
   b) passed in English
   c) passed in Hindi
9. In a college 2/5thof the students play basket ball and ¾ th play volley ball . If 50 students play none of these two games and 125 play both , use venn diagram to find the total number of students in the college.
10. In a group of 950 people, 750 can speak Hindi and 460 can speak English. Find how many can speak a) both Hindi and English
    b) Hindi only
    c) English only . Also Represent the result using venn diagram.

Chapter 3: THEORY OF INDICES

One Mark Questions:

1. The value of $\left(\frac{2a^3}{5b}\right)^3$ in its simplest form is

   a) $\frac{8a^9}{125b^3}$ b) $\frac{2a^6}{5b}$ c) $\frac{8a^6}{125b}$ d) $\frac{2a^9}{5b^3}$

2. The value of $\frac{(2^2)^0-2^{(3^0)}}{(2^0)^6-2^{(2^2)}}$ is

   a) 1/12 b) 1/13 c) 1/14 d) 1/15

3. The value of $(5^0)^2 + (5^2)^0$ is

   a) 0 b) 1 c) 2 d) 3

4. The value of $\left(\frac{1}{3}\right)^{-2}$ is

   a) 1/3 b) 1/9 c) 9 d) -9

5. The value of $\left[\left\{\sqrt[3]{x^2}\right\}^3\right]^{\frac{1}{2}}$ is

   a) x b) x^2 c) x^3 d) 1

6. Simplify $\left(x^{\frac{1}{2}} + y^{\frac{1}{2}}\right)\left(x^{\frac{1}{2}} - y^{\frac{1}{2}}\right)$

7. The value of $\left(\frac{9}{4}\right)^{-\frac{3}{2}}$ is _____

Two Marks Questions:

1. Simplify $\left(\frac{x^a}{x^b}\right)^{a+b}\left(\frac{x^b}{x^c}\right)^{b+c}\left(\frac{x^c}{x^a}\right)^{c+a}$
2. Simplify $\frac{3^{n+1}+3^n}{3^n-3^{n-1}}$
3. Simplify $\frac{2^{n+1}+2^{n-1}}{2^n+2^{n+2}}$
4. Simplify $\frac{a^{m+n}.\,a^{2m-n}}{a^{m-n}}$
5. Simplify $\frac{(3^0)^3+(3^2)^0}{(3^2)^2+3^{(3^0)}}$

Three Marks Questions:

1. If $p^x = q^y = r^z = s^w$ and $pq = rs$.Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z} + \frac{1}{w}$

2. If $a^x = b^y = c^z \ and \ b^2 = ac \ , show \ that \ \frac{1}{x} + \frac{1}{z} = \frac{2}{y}$

3. If $2^{\frac{1}{a}} = 3^{\frac{1}{b}} = 54^{\frac{1}{c}}$, $show \ that \ a + 3b = c$

4. If $3^x = 5^y = 15^z$, show that $z(x + y) = xy$

5. If $a = 3^x$, $b = 3^y$, $c = 3^z \ and \ ab = c^2$, prove that $x + y = 2z$

6. Prove that $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

7. Solve : $2^{2x} - 6.2^x + 8 = 0$

8. If $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$, $then \ show \ that \ (a + b + c)^3 = 27abc$

Chapter 4: LOGARITHMS

One Mark Questions:

1. If $log_{\sqrt{x}} 4 = 2, then\ x\ is$

   a) 1 b) 2 c) 3 d) 4

2. The value of $log_{\sqrt{3}} 27$ is

   a) 6 b) 3 c) 7 d) 4

3. The value of $\log \sqrt{\frac{9}{4}} - log\, \frac{3}{2}$ is

   a) 3 b) 9 c) 0 d) 1

4. The value of $x\ if\ log_{0.1} 10 = x$ is

   a) 0 b) -1 c) 1 d) -2

5. Express $5^3 = 125$ in logarithmic form
6. Express $3^3 = 27$ in logarithmic form
7. Express $5^{-1} = 0.2$ in logarithmic form
8. Express $log_{10} 0.01 = -2$ in exponential form.
9. Express $log_5 125 = 3$ in exponential form.
10. Express $log_9 81 = 2$ in exponential form.
11. Solve for $x,\ if\ log_x 625 = 4$

Two Marks Questions:

1. Prove that $2 \log \frac{3}{5} + 3 \log \frac{5}{2} - \log \frac{45}{8} = 0$
2. Prove that $\log \frac{9}{5} + \log \frac{15}{9} - \log \frac{3}{2} = \log 2$
3. Prove that $\log \sqrt{\frac{a}{b}} + \log \sqrt{\frac{b}{c}} + \log \sqrt{\frac{c}{a}} = 0$
4. Find the number of digits in the integral part of $a)\ (1.456)^{15}\quad b) 3^{20}$
5. Find the number of zeroes between the decimal point and the first significant figure in $a)\ (0.7)^{55}\quad b)(5.63)^{-8}$

Three Marks Questions:

1. Prove that $\frac{1}{log_2 4} + \frac{1}{log_8 4} + \frac{1}{log_{16} 4} = 4$
2. Prove that $log_4 8 . log_2 32 . log_{16} 4 = \frac{15}{4}$
3. Solve: $\log x + \log(x-4) - \log(x-6) = 0$
4. Solve : $log_2 x + log_4 x = 3$
5. Solve : $log_x 9 + log_x 4 = 2$
6. If $x = log_2 9 , y = log_9 7 , z = log_7 4 , show\ that\ xyz = 2$

Five Marks Questions:

1. Find the value of $\frac{0.5634 \times 0.0635}{2.563 \times 12.5}$ using log table.
2. Find the value of $\frac{5.6348 \times 25645}{12.72}$ using log table.
3. Find the value of $\frac{0.5679 \times 0.0789}{0.0073 \times 0.123}$ using log table.
4. Find the value of $\frac{12.567 \times 15.674}{0.5968 \times 19.78}$ using log table
5. Find the value of $\frac{213.781 \times 7.434}{6.321}$ using log table.
6. Find the value of $\frac{\sqrt{6.43} \times 0.5789}{(13.46)^{3/2}}$ using log table.

Chapter 5: PROGRESSIONS

One Mark Questions:

Answer the following multiple choice questions:

1. The 11^{th} term of the AP 3, 5, 7, 9,… is

   a. 23 b. 32 c. 21 d. 22

2. The 8th term of the AP -2, -4, -6, … is

   a. -12 b. -16 c. 12 d. 16

3. The 30^{th} term of the AP -2, -5, -8, … is

   a. -84 b. -86 c. -88 d. -89

4. The 12^{th} term of the AP 1, 4, 7, … is

   a. 37 b. 28 c. 31 d. 34

5. The 10^{th} term of the AP 0.5, 0.7, 0.9, … is

   a. 2.3 b. 1.3 c. 2 d. 1

6. If $\frac{3}{5}, K, \frac{13}{5}$ are in an AP, then K will be

   a. $\frac{5}{8}$ b. $\frac{8}{7}$ c. $\frac{8}{5}$ d. $\frac{7}{8}$

7. The 6^{th} term of the GP 3, 6, 12, … is

   a. 108 b. 96 c. 88 d. 60

8. The 7^{th} term of the GP $\sqrt{2}, 2, 2\sqrt{2}$, …is

   a. $8\sqrt{2}$ b. $4\sqrt{2}$ c. $18\sqrt{2}$ d. $16\sqrt{2}$

9. If $\frac{5}{2}, K, 10$ are in GP, then K is

   a. 3 b. $\frac{50}{3}$ c. $\frac{1}{5}$ d. 5

10. The sum to infinity of the GP $1, \frac{1}{2}, \frac{1}{4}, \ldots$ is

    a. $\frac{3}{2}$ b. $\frac{2}{3}$ c. $\frac{9}{8}$ d. 2

Answer The Following Questions:

1. Find the 4^{th} term of the GP $1, \frac{1}{2}, \frac{1}{4}, \ldots$
2. If the 1^{st} term of an AP is 3 and its common difference is -2, find its 11^{th} term.

3. Find the common difference of an AP whose 1st term is 6 and 12th term is 72.
4. Find the sum to 10 terms of the AP 2, 6, 10, …

11. Find the sum to 15 terms of the AP -7, -8, -9, …
12. find the sum to 5 terms of the GP $1, \frac{1}{4}, \frac{1}{16}, \ldots$
13. find the 10^{th} term of the HP $\frac{1}{2,}, \frac{1}{4}, \frac{1}{6}, \ldots$
14. Find the 5th term of the HP $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{9}, \ldots$
15. If $\frac{1}{3}$, x , $\frac{3}{2}$ are in HP, find x.
16. Find the sum of the GP 3, 1, $\frac{1}{3}$, … to ∞

Two Marks Questions:

1. If the 2nd term of an AP is 4 and its 10th term is 20, find its 15th term.
2. In an AP if its 3rd term is -11 and 14th term is -44, find the AP.
3. Which term of the AP $\frac{1}{2}, 1, \frac{3}{2}, \ldots$ is 5?
4. Is 8 a term of the AP $\frac{1}{3}, \frac{4}{3}, \frac{7}{3}$, …
5. If a = 1, d = 7, $T_n = 64$, find n and S_n.
6. How many terms of AP -3, -5, -7, … amount to -120?
7. Which term of the GP 4, 6, 9, … is $\frac{81}{4}$?
8. How many terms of GP 1, 3, 9, … sum up to 364?
9. If the 2nd term of a GP is 6 and its 5th term is 162, find the GP.
10. The 4th term is square of the second term in a GP and its 3rd term is 27. Find the GP.
11. If 5th term of a HP is $\frac{1}{5}$ and its 7th term is $\frac{6}{5}$, then find its 10th term.
12. If a, b, c are in GP and $a^x = b^y = c^z$, then show that x, y, z are in HP.
13. Insert 4 A.M's between 5 and 10.
14. Insert 7A.M's between 3 and 11.
15. Insert 3G.M's between -4 and -64.
16. Insert 3G.M's between $\frac{1}{4}$ and $\frac{1}{64}$.

17. Insert 3 H.M's between $\frac{1}{4}$ and $\frac{1}{12}$.

Three Marks Questions:

1. Find three terms in AP whose sum is 15 and their product 105.
2. Find four terms in AP whose sum is 20 and product of whose extremes is 16.
3. The sum to n terms of the AP 21, 23, 25, … is 384. Find the number of terms and the last term.
4. The sum of four numbers in an AP is 28 and ten times the least number is four times the greatest of them. Find the numbers.
5. The 3^{rd} and 5^{th} term of a GP are 3 and 27 respectively. Find the 8^{th} term.
6. Find three numbers in GP whose sum is 39 and their product is 729.
7. The sum of the first eight terms of the GP is five times the sum of the first four terms. Find the first term and its common ratio.
8. The first and last terms of a GP are 3 and 96 respectively and its sum to 'n' terms is 189. Find its common ratio and number of terms.
9. Find three numbers in GP whose sum is $\frac{31}{5}$ and their product is 1.
10. The sum to infinity of a geometric series is 6 and sum of first two terms is $\frac{9}{2}$. Find the first term and its common ratio

Four Marks Questions:

Find the sum to n terms of the series

1. 5 + 55 + 555 + …
2. 3 + 33 + 333 + …
3. 4 + 44 + 444 + …

Five Marks Questions:

1. Find the sum of all even integers from 40 to 160.
2. Find the sum of all integers between 100 and 300 which are divisible by 7.
3. Find the sum of all integers between 60 and 400 which are divisible by 13.

4. Find the sum of all integers between 50 and 200 which are divisible by 11.
5. The first and last terms of a GP are 4 and 128 respectively and the sum of all terms in it is 252. Find the number of terms and its common ratio.
6. Three numbers are in AP whose sum is 12. If 1, 4, 11 are added to them respectively, then the resulting numbers will be in GP. Find the numbers.

Chapter 6: THEORY OF EQUATIONS

One Mark Questions:

1. For the equation 2(7+x)-10=16-2(x-24) value of x is
   a) 15 b) 10 c) -10 d) -15
2. For the equation 2(x-3) = 9 +3(x-9) value of x is
   a) -2 b) -12 c) 9 d) 0
3. The value of x in (x+2). (x+3)=(x-2). (x-4)+20 is
   a) -4 b) 3 c) 10 d) 2
4. The value of x in 8x+17x-51=16x – 36+12 is
   a) 1 b) 5 c) 3 d) 9
5. The value of x in $7x - 5[x - \{7 - 6(x - 3)\}] = 3x + 1$is
   a) 4 b) 7 c) 8 d) 3
6. Solve $x + a\,(x + b) = ax + b$.
7. Form a quadratic equation whose root are 1 and 2.
8. Find the nature of the root of the equation$6x^2 - 5x + 2 = 0$.
9. Find the nature of the root of the equation $2x^2 + 8x + 9 = 0$
10. Solve $2x^2 - 7x + 3 = 0$.
11. Solve $x^2 + x - 6 = 0$.
12. Solve $9x^2 - 22x + 8$.
13. If $\alpha\ and\ \beta$ are the roots of the equation $2x^2 + 3x + 7 = 0$ find $\alpha + \beta$.
14. If $\alpha\ and\ \beta$ are the roots of the equation $3x^2 - 6x + 4 = 0$ find $\alpha\beta$.
15. Find the nature of the roots for the equation $2x^2 + 6x + 3 = 0$.

Two Marks Questions:

1. Solve $\frac{x+2}{5} = \frac{x-1}{2}$.
2. Solve $x + \frac{3x-5}{4} = 2 + \frac{6x-8}{5}$.
3. Solve $\frac{1}{3} - 5 + \frac{6}{2x} = \frac{2}{x}$.

4. Solve $3x^2 - 13x + 12 = 0$.
5. Solve $x^2 + 6x + 8 = 0$.
6. Solve 2x(4x-1)-15 = 0.
7. Solve $12x^2 + 23x = 24$.
8. Solve $\frac{x+19}{5} - 3 = \frac{x}{4}$.
9. Solve the following equations
   a) x + 2y = 7 and 2 x – y = 4
   b) 2x – 3y = 19 and 3x +2 y = 9
   c) x + 2y = 4 and 3x + y = 7
   d) 10x-9y =12 and 3x-9y = 17
   e) 4x-y = 2 and -3x+2y = 1
10. Form a cubic equation whose roots are 3,5 and 7.

Three Marks Questions:

1. A father is 28 years older than the son, after 5 years the father's age will be 7 years more than twice that of the son. Find their present ages.
2. Divide 110 into two parts so that 5 times of one part together with 6 times of the other part will be equal to 610.
3. The sum of three consecutive numbers is 186. Find them.
4. Five years ago, father's age was 5 times as old as his son and after 3 years he will be 3 times as old as his son. Find their present ages.
5. Two numbers are in the ratio 7:5 and their difference is 17. Find the numbers.
6. If $\alpha \; and \; \beta$ are the roots of the equation $x^2 + 3x + 7 = 0$ find the values of $\alpha^3 + \beta^3$.
7. If $\alpha \; and \; \beta$ are the roots of the equation $3x^2 - 6x + 4 = 0$ find the values of $\alpha^2 + \beta^2$.
8. If $\alpha \; and \; \beta$ are the roots of $2x^2 + 3x + 7 = 0$ find the values of $\frac{1}{\alpha} + \frac{1}{\beta}$.
9. If $\alpha \; and \; \beta$ are the roots of $2x^2 - 5x + 7 = 0$ find the values of $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$.
10. If $\alpha \; and \; \beta$ are the roots of $2x^2 - 10x + 5 = 0$ find the value of

$$\left(\frac{\alpha}{\beta^2} + \frac{\beta}{\alpha^2}\right) + 2\left(\frac{\beta}{\alpha} + \frac{\alpha}{\beta}\right) - 12\alpha\beta.$$

11. If $\alpha \; and \; \beta$ are the roots of $3x^2 + 2x + 1 = 0$ find the value of $\alpha\beta^2 + \alpha^2\beta$.
12. Find the quotient and remainder when $x^4 + 10x^3 + 39x^2 + 76x + 65$ is divided by $x + 4$.
13. By Synthetic Division, find the quotient and remainder when

    $2x^3 - 5x^2 - 32x + 6$.
14. Two numbers are in the ratio of 4:5 and if 24 is subtracted from each of them, the resulting numbers are in the ratio of 2:3. Find the numbers.
15. Find the quotient and remainder obtained by dividing $4x^3 + 3x^2 - 2x - 1 \; by \; (x + 1)$.

Five Marks Questions:

1. A certain number is 4 times the sum of the digits. If 18 is added to the number, the digits get interchanged. Find the numbers.
2. The age of father is 5 times that of son. 3 years ago, the age of the father was 8 times that of his son. Find their present ages.
3. A certain two digits number is 2 times the sum of the digits, if 63 is added to the number the digits get interchanged. Find the number.
4. A number consists of 2 digits whose sum is 4, if 18 is added to the number, the digits get interchanged. Find the number.
5. Find an integral root between -3 and 3 by inspection and then using synthetic division solve the equation :
    a) $x^3 + 6x^2 + 9x + 4 = 0$.
    b) $x^3 - 2x^2 - 5x + 6 = 0$.
    c) $x^3 - 2x^2 - 29x - 42 = 0$.

Chapter 7: LINEAR INEQUALITIES

One Mark Questions:

1. If $a > b$ implies

   a) $-a < -b$ b) $-a > b$ c) $-a < b$ d) $a < -b$

2. If $4x + 3 < 6x + 7$ when x is real number then $x \in$

   a) $(-\infty,-2)$ b) $(-2,\infty)$ c) $(-\infty, 2]$ d) $(-2,2)$

3. If $5x - 3 < 3x + 1$ when x is real number then $x \in$

   a) $(-\infty, 2)$ b) $(2,\infty)$ c) $(-\infty, 2]$ d) $(-\infty,-2)$

4. If $a < b$ and $c < 0$ then

   a) $\frac{a}{c} = \frac{b}{c}$ b) $\frac{a}{c} > \frac{b}{c}$ c) $\frac{a}{c} < \frac{b}{c}$ d) $ac < bc$

5. If $a > b$ and $c < 0$ then

   a) $a + c > b + c$ b) $a + c < b + c$ c) $a - c < b - c$ d) $ac > bc$

Solve the following inequalities

1. $3x - 4 > 7 - 2\,x, (x \in R)$
2. $5x - 3 < 7, (x \in R)$
3. $4x - 2 < 8, (x \in R)$
4. $5x - 3 < 3\,x + 1, (x \in R)$
5. $3\,(x - 1) \leq 2\,(x + 3), (x \in R)$
6. $3x + 8 > 2$ when $x \in I$ and $x \in R$
7. $\frac{x}{3} > \frac{x}{2} + 1, x \in R$

Two Marks Questions:

1. Solve $3x - 2 < 2x + 1, x \in$ R. Represent on number line.
2. Solve $3\,(1 - x) < 2\,(x + 4), x \in$ R. Represent on number line.
3. Solve $\frac{5x}{4} > \frac{5}{4}, \quad -6 \leq x \leq 6$
4. Solve $2 \leq 2x - 3 \leq 5, x \in R$

5. Solve $-2\frac{2}{3} \leq x + \frac{1}{3} < 3\frac{1}{3}, x \in R$
6. Solve $3x - 7 > 2(x - 6)$ and $6 - x > 11 - 2x, x \in R$.
7. Solve $2x + 3 \geq 18$ and $3x + 1 \leq 12, x \in R$.
8. Solve $2(x - 1) < x + 5$ and $3(x + 2) > 2 - x, x \in R$.
9. Solve $\frac{1-7x}{2} > 3$ and $\frac{3x+8}{5} < -11$
10. Solve $5x - 7 < 3(x + 3)$ and $1 - \frac{3x}{2} \geq x - 4$.
11. Solve $3x - 7 < 5 + x$ and $11 - 5x \leq 1$.

Three Marks Questions:

1. Solve $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1, x \in R$
2. Solve $\frac{5x-2}{3} - \frac{7x-3}{5} > \frac{x}{4}, x \in R$
3. Solve $\frac{x+1}{2} \geq \frac{2-x}{-3}, x \in R$
4. Solve $\frac{2x+3}{4} - 4 < \frac{x-4}{3} - 2, x \in R$
5. Solve $\frac{x}{2} \leq \frac{5x-2}{3} - \frac{7x-3}{5}, x \in R$.
6. Solve the system of inequalities $\frac{1-7x}{2} > 3$ and $\frac{3x+8}{5} < -11$
7. Solve the system of inequalities $\frac{2x+3}{4} > 3$ and $\frac{x-4}{-3} < 2$.
8. Solve the system of inequalities $\frac{2x+1}{7x-1} > 5$ and $\frac{x+7}{x-8} > 2$.
9. Solve the system of inequalities $\frac{7x-1}{2} < -3$ and $\frac{3x+8}{5} + 11 < 0$
10. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% of acid content? (water contains 0% of acid)
11. A solution is to be kept between 60°F and 77°F. What is the range in temperature in degree celcius (C) if the celcius /Fahrenheit conversion formula is given by $= \frac{9}{5} C + 32$?
12. Find all pair of consecutive even Integers which are greater than 5 and their sum must be less than 23.
13. The cost and Revenue junction of a product are given by $C(x) = 2x + 400$ and

$R(x) = 6x + 20$ respectively. Where 'x' is the number of item produced by the manufacturer. How many items the manufacturer must sell to realize some profit. $(Hint: R(x) - C(x) > 0)$.

14. A man want to cut three length from a single piece of board of length 91. The second length to be 1 larger the shortest and the 3rd length is to be twice as long as the shortest. What are the possible length of the shortest board, if the 3rd piece is to be at least 5 cm larger than the 2nd piece.
15. Find all pair of consecutive odd positive integer which are smaller than 10 such that their sum is greater than 11.
16. Suresh obtained 70 and 75 marks in first two unit tests. Find the minimum marks he should get in the 3d test to have an average of at least 60 marks. Let the marks obtained by Suresh in the third test be 'x'. Given the average of the marks of all the tests is at least 60.
17. To receive grade 'A' in a course, one must obtain an average of 90 marks or more in 5 exams. (Each of 100 marks), If Gopal's marks in the First June examination are 87, 92, 94 and 95. Find the minimum marks obtained by Gopal in 5th exam to get 'A' grade in the course?
18. Solve the following system of linear inequalities in 2 variables graphically.
    a) $x \geq 3, y \geq 2$
    b) $x + y \leq 6,\ x + y \leq 4$
    c) $2x + y \geq 8,\ x + y \geq 10$
    d) $x + 3y \geq 3,\ 2x + y \geq 2,\ x \geq 0,\ y \geq 0$
    e) $3x + 3y \leq 6,\ x + 4y \leq 4, x \geq 0,\ y \geq 0$
    f) $3x + 4y \geq 12,\ 4x + y \geq 8$
    g) $x + y \geq 5,\ x - y \leq 3$
    h) $x + 2y \leq 8,\ 2x + y \leq 8,\ x \geq 0,\ y \geq 0$
    i) $2x - 7 < 1,\ x - 2y < -1$
    j) $3x + 4y \leq 12,\ 2x + y \geq 6$

Chapter 8: SIMPLE INTEREST AND COMPOUND INTEREST

One Mark Questions:

1. The simple interest on ₹1500 at 4% p.a. for 145 days is
   a) 23.8 b) 35.6 c) 75.4 d) 36.1
2. The simple interest on ₹18000 at 12.5% p.a. for 4 years is
   a) 8000 b) 9000 c) 5000 d) 4000
3. The simple interest on ₹650 at 6% p.a. for 14 weeks is
   a) 9.5 b) 8.5 c) 10.5 d) 12.5
4. The simple interest on ₹600 for 3 years 3 months at 4% p.a is
   a) 78 b) 87 c) 67 d) 85
5. Find the simple interest on ₹5000 at 6% p.a for 250 days.
6. Find the simple interest on ₹75000 at 7.5% p.a for 8 years.
7. Find the simple interest on ₹52000 at 8% p.a for 25 weeks.
8. Find the simple interest on ₹8500 at 9% p.a for 4 years 3 months.

Two Marks Questions:

1. Pratheeksha bought a sound system for ₹22,000. If it depreciates at the rate of 11% per year , find its worth after 3 years.
2. Samarth bought a walkman for ₹1800. If it depreciates at the rate of 15% per year , how much is it worth after 3 years?
3. Preritha bought a car for ₹4,00,000. If it depreciates at the rate of 12% per year , how much will it be worth after 10 years?
4. Priya invested ₹6000 for 3 years and received ₹1080 as interest. Find the rate of interest.
5. Find the compound interest on ₹13,000 at 6% p.a. for 4 years.
6. What principal will amount to ₹46000 in 7 years at 12% p.a. simple interest?
7. Sanjay deposited ₹25000 at 8% simple interest. What is the amount he will get after 5 years?
8. In what time will the simple interest on ₹500 at 6% be equal to the interest on ₹540 for 8 years at 5%?

9. In what time will ₹35000 amount to ₹45,500 at 7.5% p.a.?
10. In how many years will a sum be double of itself at 10% simple interest?
11. What sum will amount to ₹6525 at 10% p.a compounded annually for 13 years?
12. Find the effective rate of interest when a sum lent at 12% is computed half yearly.

Three Marks Questions:

1. Sandhya invested a certain amount in a bank. When the rate of interest changed from 10% to 12.5%, her annual income increased by ₹1250. How much did Sandhya invest?
2. A person deposits ₹10,000 in a bank. If the bank offers compound interest at the rate of 5% for the first 3 years, 7% for the next 2 years and 8% from the sixth year onwards. What is the amount after 10 years?
3. Find the rate at which a sum becomes four times of itself in 15 years.
4. A sum of money doubles itself in 12 years 6 months. In how many years will it triple itself?
5. Calculate the compound interest on ₹600 for $4\frac{1}{2}$ years at 7% p.a.
6. In how many years a sum of ₹2000 becomes ₹2205 at the rate of 5% p.a. compound interest?
7. Find the compound interest on ₹6000 for 3 years at 5% p.a if interest is calculated half yearly.

Five Marks Questions:

1. Privil invested a part of ₹6,500 at 10% simple interest and rest of it at 12% simple interest. At the end of three years he got a total amount of ₹8690. How much money he had invested at different rates?
2. Three equal principals amount to ₹3720 after 3,4 and 5 years at simple interest 6% p.a. Find the principal.
3. Jason invested an amount of ₹12000 at the rate of 10% p.a. simple interest and another amount at the rate of 20% p.a. simple interest. The total interest earned at the end of one year on the total amount invested became 14% p.a. Find the total amount invested.

4. Satwik obtained a loan of ₹4000 at an interest rate of 6% per year. He immediately lent ₹2500 at an interest rate of 9% per year to Jason and balance at 12% per year to Vivek. After 3 years he collected the amount due to him and repaid his loan. Find his gain.
5. If the difference between simple interest and compound interest for 3 years at 2.5% p.a. is ₹625, find the sum invested.
6. Suraj borrowed ₹18000 at 5.5% p.a simple interest for 3 years and lent it to Akash at 5.5% p.a compound interest for 3 years. What interest was paid and received by Suraj and what gain did he make in this transaction?
7. A person borrows a certain sum of money at 3% p.a. simple interest and invests the same at 5% p.a. compound interest compounded annually. After 3 years he makes a profit of ₹1082. Find the amount he borrowed.
8. Praveen invested equal amounts one at 6% SI and the other at 5% CI. If the former earns ₹437.5 more as interest at the end of two years, find the total amount invested.
9. The difference in compound interest and simple interest on a sum for 2 years at 10% p.a. when compound interest is computed annually is ₹16. Find the difference in compound interest and simple interest if compound interest is computed half yearly.
10. A person borrowed ₹65000 at 8% simple interest for 4 years and lent out the money for 10% compound interest for 4 years. How much did the person gain?

Chapter 9: ANNUITIES

Two Marks Questions:

1. What is the present value of an income of 3000 to be received forever if the interest rate is 14% p.a.
2. A Maths professor while retiring wants to institute a scholarship of ₹5000 every year to the student scoring highest marks in I Basic Maths annual exam. How much should he deposit if bankoffer 5% p.a.
3. Find the present value of a perpetuity of ₹3000 to be received forever at 4% p.a.
4. A scholarship of ₹2000 every year has to be instituted. How much should be invested today if the interest rate is 8%p.a?
5. A person endows a bed in a hospital at the cost of ₹7000 p.a If the interest rate is 14% p.a how much should he provide in perpetuity?
6. A Maths professor while retiring wants to institute a scholarship of ₹5000 every year to the student scoring highest marks in I Basic Maths annual exam. How much should he deposit if bank offer 5% p.a.
7. Find the present value of an annuity due of 8000 for 5 years at 5% p.a.
8. Find the present value of an annuity of ₹400 for 3 years at 16% p.a compound interest.
9. Find the future value of an annuity of ₹500 at 5% p.a payable for 5 years.
10. Suppose you have decided to deposit 10,000 per year in your Public Provident fund account for 25 years. What will be the accumulated amount in your Public provident fund at the end of 25 years if the interest rate is 11%.

Five Marks Questions:

1. A company needs ₹1,50,000 at the end of 10 years from now. It would like to set a side an equal amount each year from its profit. If the present market rate is 15%. How much should be the annual amount to be invested?

2. A company has an obligation to redeem 2 lakhs bonds 6 years hence. How much should the company deposit every six months in a sinking find account which offers 14% p.a interest compounded half yearly to accumulate 2 lakhs in 6 years.
3. A father wants to send his child for higher studies after 15 years. He expects the cost of higher studies to be 1,00,000. How much should he save annually to have 1,00,000 after15 years if interest rate is 12% p.a?
4. A Company advertises that it will pay a lumpsum of ₹8000 at the end of 6 years. If the interest rate is 12%, how much is the company demanding as annual deposit every year for the next 6 years?
5. Find the present value of an annuity of ₹2500 payable at the end of each 6 months for 5 years if money is worth 10% converted semi-annually.
6. Find the present value of an annuity of ₹3000 for 12 years at 6% p.a computed half yearly.
7. A man borrows 20,000 and agrees to pay the borrowed amount in 10 equal installments at the rate of 6% p.a. Find the amount of each installment.
8. What is the annual income that can be obtained for the next 12 years from an initial payment of ₹50,000 if the interest rate is 15% ?
9. How much should you invest today at 8% p.a. Compound interest computed quarterly so that you get ₹3000 every 3 months for the next 7 years.
10. Find the present value of an annuity of ₹500 payable for 10 years hence when interest of 10% is Compounded half yearly.
11. A person repaid his loan in 10 equal annual instalments starting from the beginning of the first year. If each instalment was ₹6000 and compound interest charged was 12% p.a. What was the amount borrowed.
12. Find the future value of an annuity of ₹2000 for 6 years, if the payment is made at the beginning of each year, interest rate being 10% p.a.
13. How much should you invest if you want to receive ₹5000 at the beginning of each year for the next 5 years if the compound interest is 16% p.a Compounded quarterly.
14. A man borrowed ₹20,000 and agrees to pay the borrowed amount in 10 equal instalments at the rate of 6% p.a. Find the amount of each instalment the first being paid at the end of the 2nd year after the money was borrowed.

15. A person purchases a house for ₹25 lakhs with ₹5 lakhs as down payment. The Rest of the amount he loans from a bank which offers 16% p.a compound interest and has to repay the loan in 20 equal annual instalments. If the first instalment is paid at the end of the third year, find how much he has to pay each year?

Chapter 10: AVERAGES

One Mark Questions:

1. The age of 10 boys in a class are 13, 14, 14, 12, 13, 15, 17, 16, 15 and 14 years. The average age is

   a) 14.4 b) 14.1 c) 14.2 d) 14.3

2. In a class of 8 students, the marks obtained in Basic Mathematics are 78, 79, 65, 63, 56, 92, 99, 100. The average marks is

   a) 78 b) 79 c) 77.5 d) 78.5

3. The weight 6 women are 52kg, 50.5 kg, 58kg, 45.5 kg., 46 kg, and 48 kg, The average weight is

   a) 50 b) 52 c) 51 d) 50.5

4. The rainfall in a week in Mangalore are 20mm, 25mm, 25mm, 31mm, 21mm, 17mm and 29mm. The average rainfall is

   a) 20 b) 23 c) 24 d) 22

One Mark Questions:

1. The height of 10 girls in Dance class are 90 cm, 95cm, 100cm, 98 cm, 102cm, 110cm, 105 cm, 97 cm, 102cm, 99 cm. Find the average height.
2. The age of 10 boys in a class are 4.3, 4.4, 4, 4.2, 4.3, 4.5, 4.7, 4.6, 4.5 and 4.8 years. What is the average age?
3. The average age of 10 boys in a class is 13 years. What is sum of their Ages?
4. In a class of 10 students, the marks obtained in Mathematics are 88, 71, 35, 30, 46, 92, 67, 53, 76 and 28. What is the average Marks?
5. The rainfall in a week in Bangalore are 18mm, 25mm, 20mm, 9mm, 30mm, 10mm, 15mm. Find the Average rainfall
6. The weight 6 men are 90kg, 70.5 kg, 56 kg, 45.5 kg., 85 kg, and 78 kg, Find average weight.

Two Marks Questions:

1. Ramesh has 4 Kannada, 5 English, 6 Maths books. Each Kannada Book cost Rs. 8.50, English Rs. 10.50, and Maths Rs. 15.00. Find the Average cost per book of all 3 subjects.
2. 5 Kg. of sugar at the rate of 15/Kg., 8 kg. of wheat at the rate of 22/kg., 7 kg. of rice at Rs.35/kg. and 4 kg. of oil at 85/ kg. What is the Average price/kg. of all the commodity.
3. The average weight of 12 girls in a class in 4 feet and the average Height of 8 boys in 5 feet. Find the combined average height of Both girls and boys.
4. The average age of 7 member of a family is 18 years. If the head of the Family is excluded the average age of the rest of the members would Fall to 13 years. What is the age of the head of the family?
5. The average marks of 15 students of a class is 45. A student also has Secured 50 marks leaves the class room. Find the average marks of the remaining 14 students?
6. The average age of 10 students is 6 years. The sum of the ages of 9 of them is 52 years. Find the age of 10 students.
7. The average age of 12 boys is 8 years. Another boy 21 years join the Group. Find the average of the new group.
8. The average score of 20 boys is 60% and average score of 30 girls is 70%. Find the combined average score.
9. The average height of a group of people is 6 ft. 10 more people are added with an average height of 5 ft. Find the average height of the group of people consisting of 60 people.
10. Ram and Rahim went up a hill at a speed of 20 kmph. And both of them came tumbling down the same distance at a speed of 30 kmph. Find the average speed for the round trip.
11. Thirty five boys and sixty five girls are tested for their numerical abilities. The boys have an average score of 80% and the girls score an average of 90%. Calculate the average score of boys and girls combined.
12. A Train runs at a speed of 28 kmph for 4 hours at 30 kmph for 5 Hours and the remaining 40 kms in 1 hour. What is the total distance and what is the average speed/hr.

13. Rekha purchased 3 varieties of cooking oil, 5 kg. of oil at 100/Kg, 6 kg of oil at 110/Kg. and 9 kg. of oil at 120/kg. What is the average price of the oil/kg.

Three Marks Questions:

1. The average weight of 10 boys is 30 kg. If a 11^{th} boy is added the average weight increased by 2 kg. Find the weight of 11^{th} boy.
2. A farmer walks from village A to village B at the speed 10 kmph and returned back in 15 kmph. Find his average speed of the entire Journey.
3. The average age of 10 students in 14 years. Among them the average age of 4 student is12 years. Find the average of the remaining students.
4. A batsman find that by getting out for a duck (0 runs) in the 11^{th} inning of his test matches. His average of the previous 10 innings decreased by 5 runs. What is his average after the 11^{th} innings?
5. A schools runs in morning and afternoon shift and employees 40 teachers. The average salary of 25 teachers working in the morning shift is Rs. 2800/- and the average salary of teachers working the afternoon shift is Rs. 3000/- find
   i) The average salary of the teachers in the school.
   ii) The average salary is 5 teachers shifted from morning to afternoon shift.
6. Find the total wage earned per month by 564 workers in a factory given. The following information; 38 workers get Rs. 8.5 to 12.5, 46 workers get Rs. 12.5 to 16.5, 120 workers get Rs. 16.5 to 20.5, 360 workers get Rs. 20.5 to 24.5 daily wages (assuming that a month has 30 days and all the day they work) ?.
7. The average age of Ashok and Abdul is 45 years, the average age of Abdul and Anthony is 50 years and the average age of Anthony and Ashok is 35 years. Find the age of Abdul, Ashok and Anthony.
8. A book seller bought 228 note books at an average price of Rs. 8.50 in which 80 books he bought at Rs. 7.50, each and 84 books at Rs. 10.50 each. Find the price of the remaining books per unit.

9. A merchant buys two types of chalk Powder A and B at `5.70 and `6.40 per kg respectively. He mixes them in the proportion 4:3 and sells the mixture at `7.20/kg. What is his Profit and Profit %?
10. The average weight of a group containing 25 persons is 70 kg. 5 Persons with an average weight 63 kg leave the group and 4 Persons with weight 72 kg, 78 kg, 70 kg and 73 kg joins the group. Find the average weight of the new group.

Four And Five Marks Questions:

1. A painter works 8 hrs. on Monday, 9 hrs on Tuesday, 7½ hrs on Wednesday , 7½ hrs on Thursday, 6 hrs. on Friday and 10 hrs on Saturday. He is paid on hourly wages at the rate of Rs. 8.50. What is his average daily earning?
2. An Aeroplane flies once round a square whose side is 100 km long taking the first at 100 kmph., second at 200kmph,third at 300kmph and the fourth at 400kmph. Find the average speed of the plane in its flight along the square.
3. Of a number of persons donating to a charity 10 persons gave Rs. 99 each, 25 gave Rs. 50 each, 33 gave Rs. 25 each, 46 gave Rs. 10 each and the Rest gave Rs. 5 each. It was found that the average donation is Rs. 20/- How many donors are there?
4. Govind bought 11 bags in the whole sale market at an average price of Rs. 450 each. In which the price of 7 leather bags were Rs. 575 each. The price of the remaining 4 cotton bags all in the increasing Arithmetic Progression having the price of the costliest cotton bag was Rs. 300/-. Find the price of the cheapest cotton bag.
5. Rajhamsa bus covers the distance of 360 km between Bengaluru and Chennai in 5 hrs. 45 minutes with a stoppage of 10 minutes for coffee and Tiffin and a stoppage of 3 minutes at Bannerghatta Bus stop and 2 stoppages of 5 minutes each at Hosur and Dharmapuri bus stop respectively. What is the average speed of the bus?
6. Ramesh bought 4 shirts in a discount sale. The average price of the shirt being `150/-, the average price of two polyster shirts is Rs.170. If the price of the remaining 2 cotton shirts is in the ratio 7:6. Find the price of the cheapest cotton shirt.

7. The average height of a group of boys and girls is 38 kg. The average weight of the boys in 42 kgs and that of the girls is 33Kgs. If the numbers of girls is 20. Find the number of boys.
8. A batsman finds that by scoring a century in the 11^{th} innings of his test matches he has bettered his average of the previous ten innings by 5 run. What is the average after the 11^{th} Innings.

Chapter 11: PERCENTAGE, PROFIT AND LOSS

One Mark Questions:

1. Convert ¾ into percentage

   a) 75% b) 25% c) 50% d) .75%

2. Convert 8% into fraction

   a) 2/25 b) .08 c) .8 d) 8/10

3. Convert 1:2 into percentage

   a) 75% b) 25% c) 50% d) .75%

4. Convert 25% into decimal

   a) 0.25 b) 0.0025 c) 0.025 d) 2.5

5. Convert 0.97 into percentage

   a) 75% b) 25% c) 98% d) 97%

6. Convert 35% into ratio

   a) 7:20 b) 20:7 c) 7:2 d) 35:1

7. What percent is 68 km of 140 km?
8. What percent is 12 paise of Rs58?
9. Find 14% of 1hour 28 minutes ?
10. A man purchased a laptop for Rs 90000. For what price should he have sold it to face a loss of 7%?
11. Find the value of a house in the purchase of which the broker was paid 2.5% brokerage which amounted to Rs 90000.
12. If a company makes a profit of Rs 10000 by selling goods worth Rs 25000 then find the profit percentage
13. A person bought a cycle for Rs 3000. For what price should he sell it to gain 10%?
14. By selling a mobile at Rs.1300 the profit made is Rs.57. What is the cost price of the mobile?
15. If a person makes a profit of Rs 1200 by selling a watch worth Rs 6000. Find the profit percentage

16. A watch is sold for Rs 150 at a profit of 25% . At what price should it be sold in order to have 50% proftit?
17. Find the cost price of the article which is sold for Rs 550 at a loss of 10%
18. Vishaal gets Rs 50000 after getting an increase of 10% in his salary. What is his original income?

Two Marks Questions:

1. A's income is 10% more than B's.How much is B's income less than A's.
2. What is the percentage error?
3. The original price of a watch was Rs.3500. It was decreased by Rs800. What is the percentage decrease of the price of the watch?
4. The cost price of 12 articles is equal to the selling price of 9 articles . Find the profit percent.
5. A student has to score 50% marks to pass. He gets 100 marks and yet fails by 50 marks. Find the maximum marks.
6. When 35% of a number is added to 38, the result is the number itself. Find the number
7. While taking measurement a tailor writes 34 instead of 24.
8. Sanju and Shrya scored 50% and 65% in an examination. If the difference in their marks is 36, find the maximum marks
9. After revaluation a student marks was changed from 80 to 92. Find the percentage increase in marks.
10. Akshay gets 25000 after getting an increase of 12% in his salary. What is his original income?
11. A dealer professes to sell his goods at cost price, but he uses a weight of 960 gm for the kg weight. Find his gain percent?
12. Find the cost price of the article which is sold for Rs 220 at a loss of 12%?
13. By selling 16 rings a shopkeeper loses the selling price of 4 rings. Find the loss percent?
14. Abhinav saves Rs 75 by getting a discount of 15% on a text book. How much did he pay for the book?

15. The difference between the cost price and the selling price is Rs 225. If the profit percentage is 16% then find the selling price?
16. A seller bought an item for Rs 10000.He marked the selling price as Rs 25000.If he sells the TV after giving the discount of 30% from the marked price, find the profit percentage?

Three Marks Questions:

1. An article is sold at Rs 36 there is a profit of Rs 8. If it is sold at a loss of 8% then find the selling price of the article?
2. A number X is mistakenly multiplied by 10 instead of being divided by 10 . What is the percentage error in the result
3. A sells a laptop to B at a profit of 18% and B sells to C at a profit of 25%. If C pays Rs 2800 for the laptop then find the price at which A purchased it.
4. 1 kg of salt and 4 kg of sugar cost Rs 160. But if the cost of the sugar rose by 20% and that of salt by 10% the same quantity of salt and sugar would cost Rs 190. What is the price of salt and sugar per kg?
5. Ram purchased two dogs for Rs 18000 and Rs 15000 respectively. He sold them oneat a loss of 15% and the other at a gain of 19% . Find the selling price of each of the dogs and Also find the overall loss or gain percent in the transaction
6. Neha refused to sell her book for Rs 726 because there was a loss of 12% . If she sold the book at a profit of 8% find the selling price
7. Crystal electronics sold a calculator at a profit of 5% instead of loss of 5%, and got Rs 11 more. Find the cost price of the calculator.
8. A man buys an article at one fourth of its cost value and sells it for 25% more than its cost value. What is his profit percentage?
9. Monthly income of A,B and C were increased from 25000, 22000 and 15000 to 35000, 26500 and 18000 respectively. Find Whose gain percent is maximum?
10. By how much percent the use of milk be increased if the price of the milk is decreased by 15% so that the expenditure remains unchanged.

Five Marks Questions:

1. A person spent 25% of his salary and thereafter Rs 22000 and further 12% of the remainder. If Rs 18900 is still remaining then what was his total salary?
2. A dealer sold 3 furniture sets at Rs 12500 each .He sold one at a profit of 12% and the other two at a loss of 6%. Find the the gain or the loss percentage in this transaction.
3. A person gives 60% of his income to his wife, 30% of the remaining he spends on recreation , 10% of the remaining he gives to his daughter as pocket money and still saves Rs 7000. What is his income and also find the amount he gives to his wife and daughter?
4. A merchant purchased 25 baskets of fruits at Rs 2 per basket. The fruits of 5 baskets turned out to be bad and were thrown off. Find the selling price per basket if he wants 13% profit.
5. Rohan sold to Raksha cinema tickets at a gain of 10%. Raksha sold it back to Rohan at a loss of 10%. In the whole process Rohan gain Rs 55 in all . Find the price at which Rohan originally bought the tickets.
6. Namma T V is a popular TV channel. It telecasts the program from 8 am to 12 noon . It telecasts 60 advertisements each of 8 seconds and 16 advertisements each of 30 seconds. What is the percentage of time devoted in a day for the advertisement?
7. In a dance competition 70% of the participants were girls, 35% of the boys and 65% of the girls got qualified for the next round. If 49 girls were eliminated find the number of boys who were eliminated
8. There were two candidates in an election, 20% of the members in the voters list did not cast their votes and 50 votes were declared invalid . The successful candidate secured 300 votes more than his rival. If 45% of the total members voted in favour of the successful candidate then find the votes secured by each candidate
9. A business man sells an article for Rs 720 and earns a profit of 20%. Find the a)cost price b) Profit percentage at selling price
10. A radio is sold at a profit of 25%. Cost price and the selling price both are increased by Rs 100 . If the new profit is at the rate of 20% then find the original cost of the radio.

Chapter 12: LINEAR FUNCTIONS

Four Marks Questions:

1. The manufacturer of a leather company produces and sells bags at Rs 8/unit. His fixed cost is Rs 5550, and the variable cost per bag is Rs 2.45. Find:
    a. Revenue function
    b. Cost function
    c. Profit function
    d. BEP in unit
2. The fixed cost of a firm and the variable cost per unit of the product are Rs 5000 and Rs 5, respectively. If the selling price per unit is Rs 15, find:
    a. BEP in units
    b. Revenue function
    c. Cost function
    d. Prove that the total revenue is equal to the total cost at BEP
3. A publishing house finds that the production of each book and the cost of the book are directly attributed. If the cost of each book is Rs 30 and the fixed costs are Rs 15,000, and the selling price of each book is Rs 45, then determine:
    a. Revenue function
    b. Cost function
    c. Profit function
    d. Break-even point function
4. A confectioner makes and sells biscuits. He sells one pack of biscuits at Rs 80. His cost of manufacturing is Rs 8.40 per packet as a variable cost and Rs 3000 as fixed cost. Find the:
    a. Revenue function
    b. Cost function
    c. Profit function
    d. If he limits his production to 100 packets, can he make a profit?
5. If the sale price per unit is Rs 3, the variable cost per unit is Rs 2, and the total fixed cost is Rs 4200, find:

a. Total cost function
b. Total revenue function
c. If a profit of Rs 10,000 is desired, then find the volume of output to be produced and sold
d. Sketch the break-even chart

6. A manufacturer of steel vessels finds that his cost function is linear. He calculates that the total cost for 250 units is Rs 8000, and for 350 units, the total cost is Rs 10,000. What are the fixed cost and the variable cost per unit?
7. A manufacturer sells his product at Rs 8.35 per unit. He is able to sell his entire production. His fixed cost is Rs 2116, and the variable cost per unit is Rs 7.20. Find:
   a. Cost function
   b. Revenue function
   c. Profit function
   d. Break-even output
8. If "x" represents the number of units produced, the selling price per unit is Rs 14, the variable cost per unit is Rs 7.33, and the fixed cost is Rs 1200. Find:
   a. Revenue function
   b. Cost function
   c. Profit function
   d.Break-even output

Chapter 13: ANGLES AND TRIGONOMETRIC RATIOS

One Mark Questions:

1. Radian measure of 25° is

   a) $\frac{\pi}{8}$ b) $\frac{7\pi}{6}$ c) $\frac{3\pi}{4}$ d) $\frac{5\pi}{36}$

2. Sexagesimal measure of $\frac{3\pi}{5}$ is

   a) 520° b) 460° c) 135° d) 120°

3. Degree measure of $\frac{\pi}{24}$ is

   a) 4.5° b) 7.5° c) 8.5° d) 9.5°

4. If $\sin\theta = \frac{3}{5}$ and θ is acute, then $\cos\theta$ is

   a) $\frac{4}{5}$ b) $\frac{6}{5}$ c) $\frac{7}{3}$ d) $\frac{8}{3}$

5. If $\tan\theta = \frac{4}{3}$ and θ is acute, then $\cot\theta$ is

   a) $\frac{3}{4}$ b) $\frac{4}{5}$ c) $\frac{5}{3}$ d) $\frac{4}{5}$

6. The value of $(1 - \sin^2\theta).\sec^2\theta$ is

   a) 0 b) 1 c) 2 d) 3

7. Express $\frac{7\pi}{3}$ in Sexagesimal measure.

8. The angles of a triangle are in the ratio 2:3:4 Express them in radian measure.

9. Express 720° in radian measure.

10. Express $\cos\theta$ in term of $\sin\theta$.

11. If $x = a\cos\theta,\ y = a\sin\theta. Show\ that\ x^2 + y^2 = a^2$

12. Prove that $\sin^2\theta + \cos^2\theta = 1$.

13. Prove that $\cos A\,.\tan A = \sin A$.

14. Prove that $(\sec^2 A - 1).\cot^2 A = 1$.

Two Marks Questions:

1. The angles of a triangle are in the ratio 3:4:5. Find them in radians and in degrees.

2. The difference of two angles is 45° and their sum is 90°. Find the angles in degrees and in radians .
3. The angles of a triangle are in A.P and the greatest angle is 84°. Find all the three angles in radians.
4. The angles of a triangle are in A.P and the greatest is 5 times the least. Find the angles in radians.
5. The greatest angle of a cyclic quadrilateral is double the least and the difference of the other two angles is 30°. Find the angles in radians.
6. Prove that $\sec A - \cos A = \tan A \,.\, \sin A$.
7. If $x = a \sec\theta\,,\ y = b \tan\theta$. Prove that $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
8. Prove that $\sqrt{\frac{1-\sin A}{1+\sin A}} = \sec A - \tan A$.
9. Prove that $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \,.\, \operatorname{cosec}^2 A$.
10. Prove that $(\cos A + \sin A)^2 + (\cos A - \sin A)^2 = 2$.
11. Prove that $\tan^2 A\,(1 - \sin^2 A) = \sin^2 A$.
12. Prove that $(\operatorname{cosec}^2 A \,.\, \tan^2 A) - 1 = \tan^2 A$.
13. Prove that $\frac{1}{\sec A + \tan A} = \sec A - \tan A$.
14. Prove that $\tan^2 A + \sec^2 B = \sec^2 A + \tan^2 B$.
15. Prove that $(1 + \tan^2\theta).(1 - \sin^2\theta) = 1$.
16. Prove that $(1 + \cot\theta)^2 + (1 - \cot\theta)^2 = 2\operatorname{cosec}^2\theta$.
17. Prove that $\tan A + \cot A = \sec A \,.\, \operatorname{cosec} A$.

Three Marks Questions:

1. Prove that $(1 + \sin\theta + \cos\theta)^2 = 2(1 + \sin\theta)(1 + \cos\theta)$.
2. Prove that $\frac{1}{1+\cos A} + \frac{1}{1-\cos A} = 2\operatorname{cosec}^2 A$.
3. Prove that $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2\sec A$.
4. Prove that $\frac{\sec A + \tan A + 1}{\sec A - \tan A + 1} = \sec A + \tan A$.

5. If $\tan\theta = \frac{a}{b}$ *Show that* $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2 - b^2}{a^2 + b^2}$.
6. If $\sin A + \cos A = \sqrt{2}\sin A$. Show that $\sin A - \cos A = \sqrt{2}\cos A$
7. If $\tan\theta + \sec\theta = \frac{5}{2}$ then find $\sin\theta$.
8. Prove that $\cos^4 A - \sin^4 A = 1 - 2\sin^2 A$.
9. Prove that $\sec^6 A - \tan^6 A = 1 + 3\tan^2 A \,.\sec^2 A$
10. Prove that $\frac{\cot A + \tan B}{\cot B + \tan A} = \frac{\cot A}{\cot B}$.
11. Prove that $\sqrt{\sec^2 A + \operatorname{cosec}^2 A} = \tan A + \cot A$.
12. Prove that $\sqrt{\frac{\sec A + \tan A}{\sin A - \tan A}} = \frac{1 + \sin A}{\cos A}$.
13. Prove that $\frac{1+\sin A}{1-\sin A} - \frac{1-\sin A}{1+\sin A} = 4\sec A \,.\tan A$
14. If $\cot A = \frac{5}{12}$ *and* θ *is acute*. Show that $2\operatorname{cosec}\theta - 4\sec\theta = \frac{247}{30}$.

Five Marks Questions:

1. Prove that $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} = 1 + \sec A \,.\operatorname{cosec} A$.
2. If $\cot\theta = \frac{5}{2}$ *and* θ is acute. Then Prove that $\frac{3\cos\theta + 2\sin\theta}{3\cos\theta - 4\sin\theta} = \frac{19}{7}$.
3. If $x = r\cos A\cos B,\ y = \theta r\cos A\sin B$ *and* $z = r\sin A$. Then prove that $x^2 + y^2 + z^2 = r^2$.
4. If $x = a\sin\alpha\cos\beta$, $y = b\sin\alpha\sin\beta$ *and*$z = \cos\alpha$ Show that $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$
5. If $\tan A = \frac{p}{q}$. Then prove that $\frac{p\sin A - q\cos A}{p\sin A + q\cos A} = \frac{p^2 - q^2}{p^2 + q^2}$.
6. If $\sin\theta = \frac{a-b}{a+b}$ Show that $\tan\theta + \sec\theta = \sqrt{\frac{a}{b}}$.
7. If $\tan A + \sin A = m$ *and* $\tan A - \sin A = n$. Show that $(m^2 - n^2)^2 = 16mn$.
8. If $\cos\theta = \frac{4}{5}$ *and* θ is acute. Show that $\frac{2\tan\theta}{1-\tan^{-1}\theta} = \frac{24}{7}$.
9. If $\cot\theta = \frac{5}{2}$ *and* θ is acute. Then Prove that $\frac{5\cot\theta + 2\sin\theta}{5\cot\theta - 2\sin\theta} = \frac{29}{21}$.
10. Prove that $\frac{1}{1+\sin^2\theta} + \frac{1}{1+\cos^2\theta} + \frac{1}{1+\sec^2\theta} + \frac{1}{1+\operatorname{cosec}^2\theta} = 2$
11. If $\tan A + \sin A = m$ *and* $\tan A - \sin A = n$. Show that $m^2 - n^2 = 4\sqrt{mn}$.

12. Prove that $\frac{\tan A - \sin A}{\sin^2 A} = \frac{\tan A}{1+\cos A}$.

13. Prove that $\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A} + \frac{\cos^3 A - \sin^3 A}{\cos A + \sin A} = 2$.

14. If $\sin x + \sin^2 x = 1$. Then Prove that $\cos^2 x + \cos^2 x = 1$.

15. If $x = a\cos\theta + b\sin\theta$, $y = a\sin\theta - b\cos\theta$. Show that $x^2 + y^2 = a^2 + b^2$.

Chapter 14: STANDARD ANGLES AND ALLIED ANGLES

One Mark Questions:

1. The value of $\sin 30^\circ . \cos 60^\circ + \cos 30^\circ . \sin 60^\circ$ *is*

   a) 1 b) $\frac{9}{16}$ c) $\frac{4}{15}$ d) 0

2. The value of $\tan 225^\circ$ *is*

   a) $\frac{3}{4}$ b) $\frac{-5}{6}$ c) $\frac{1}{2}$ d) $\frac{7}{3}$

3. The value of $\sin(-780^\circ)$ *is*

   a) $\frac{3}{4}$ b) $\frac{-\sqrt{3}}{2}$ c) $\frac{-1}{2}$ d) $\frac{\sqrt{5}}{3}$

4. The value of $\sec\left(\frac{11\pi}{6}\right)$ *is*

   a) $\frac{\sqrt{5}}{4}$ b) $\frac{5}{3}$ c) $\frac{11}{2}$ d) $\frac{2}{\sqrt{3}}$

5. If $A = 60^\circ$ then the value of $\sin 2A$ is

   a) $\frac{7}{4}$ b) $\frac{\sqrt{3}}{2}$ c) $\frac{3}{2}$ d) $\frac{\sqrt{5}}{7}$

6. The value of $\sin 30^\circ . \cos 60^\circ + \cos 30^\circ . \cos 60^\circ$ *is*

   a) $\frac{1}{\sqrt{2}}$ b) $\frac{1-\sqrt{3}}{4}$ c) $\frac{\sqrt{3}}{2}$ d) $\frac{1+\sqrt{3}}{4}$

7. The value of $\cos 120^\circ$ *is*

   a) $\frac{3}{7}$ b) $\frac{-\sqrt{5}}{2}$ c) $\frac{-1}{2}$ d) $\frac{\sqrt{5}}{3}$

8. The value of $\tan\left(\frac{16\pi}{3}\right)$ is

   a) 2 b) $\frac{1}{\sqrt{3}}$ c)$\sqrt{3}$ d) $\frac{4}{3}$

9. The value of $\cos 1125^\circ$ *is*

   a) $\frac{\sqrt{2}}{3}$ b) $\frac{1}{3}$ c) $\frac{11}{2}$ d) $\frac{1}{\sqrt{2}}$

10. The value of $\tan\left(\frac{11\pi}{4}\right)$ is

    a) -1 b) 0 c) $\sqrt{3}$ d) 1

11. If $A = 45^\circ$ then Show that $\sin 2A = 2 \sin A \cos A$.

12.If$A = 60^\circ$ Verify $\tan 2A = \frac{2\tan A}{1+\tan^2 A}$

Two Marks Questions:

1. Find the value of $\sin^2\frac{\pi}{6} + \cos^2\frac{\pi}{3} - \tan^2\frac{\pi}{4}$.
2. Simplify $\frac{\cos(360+A).\sec(-A).\tan(180-A)}{\sec(360+A).\sin(180-A).\cot(90-A)}$
3. Simplify $\frac{\cos 120^\circ + \sin 135^\circ}{\sin 135^\circ - \cos 120^\circ}$
4. If A,B and C are the angles of a triangle then Prove that $\cos\left(\frac{A+B}{2}\right) = \sin\frac{C}{2}$
5. Find the value of $\cos^2 45^\circ - \cos^4 30^\circ + \sin^2 30^\circ + \sin^4 60^\circ$.
6. Find the value of $\cos 570^\circ . \sin 510^\circ - \sin 330^\circ . \cos 390^\circ$
7. Find the value of $\sec^2\frac{\pi}{6} + \text{cosec}^2\frac{\pi}{4} + \cot^2\frac{\pi}{3} + \sin^2\frac{\pi}{2}$
8. Find the value of$\cos 60^\circ - \sin 30^\circ - \cot^3 45^\circ$.
9. Find the value of$3\tan^2\frac{\pi}{6} + \frac{4}{3}\cos^2\frac{\pi}{6} - \frac{1}{2}\sec^2\frac{\pi}{4} - \frac{1}{3}\sin^2\frac{\pi}{3}$
10. Find the value of$\sin 30^\circ . \cos 60^\circ + \cos 30^\circ . \sin 60^\circ$
11. Prove that $\frac{\sin(90+\theta).\cos(180-\theta).\cot(270+\theta)}{\sin(90-\theta).\sin(270-\theta)\cot(90+\theta)} = 1$
12. Prove that $\cos(287^\circ) - \sin(17^\circ) = 0$
13. Prove that $\tan 225^\circ . \cot 405^\circ + \tan 765^\circ . \cot 675^\circ = 0$
14. Prove that $\sin 480^\circ \cos 690^\circ + \cos 780^\circ \sin 1050^\circ = \frac{1}{2}$.

Three Marks Questions:

1. Find the value of $3\tan^2 30^\circ + \frac{4}{3}\cos^2 30^\circ - \frac{1}{2}\cot^2 45^\circ - \frac{2}{3}\sin^2 60^\circ + \frac{1}{8}\sec^4 60^\circ$.
2. Find the value of$\frac{\sin^2 60^\circ.\cos^3 60^\circ.\sec^2 30^\circ}{2\cos^2 30^\circ - \frac{1}{2}\sin^2 60^\circ.\tan^2 30^\circ}$
3. Show that $\left(\frac{1-\cot\frac{\pi}{3}}{1+\cot\frac{\pi}{3}}\right)^2 = \frac{1-\cos\frac{\pi}{6}}{1+\cos\frac{\pi}{6}}$

4. Find x if $x \sin 30 \,.\cos^2 45 = \frac{\cot^2 30.\sec 60.\tan 45}{\operatorname{cosec}^2 45.\operatorname{cosec} 30}$

5. Find x if $\frac{x \operatorname{cosec}^2 30^\circ.\sec^2 45^\circ}{8 \cos 45^\circ.\sin 60^\circ} = \tan^2 60^\circ - \tan^2 30^\circ$

6. Find x if $\frac{x \sin^2 300.\sec^2 240}{\cos^2 225.\operatorname{cosec}^2 240} = \cot^2 315 \,.\tan^2 300$

7. Find x if $\frac{x \operatorname{cosec}^2 30^\circ.\sec^2 45^\circ}{\sin^2 45^\circ.\cos^2 60^\circ} = \tan^2 60^\circ - \cot^2 60^\circ$.

8. Simplify $\frac{\sin 150^\circ - 5 \cos 300^\circ + 7 \tan 2250^\circ}{\tan 135^\circ + 3 \sin 210^\circ}$.

9. Simplify $\cos A + \sin(270 + A) - \sin(270 - A) + \cos(180 + A)$

10. Simplify $\sec\left(\frac{3\pi}{2} - A\right) \sec\left(\frac{\pi}{2} - A\right) - \tan\left(\frac{3\pi}{2} - A\right) \tan\left(\frac{\pi}{2} + A\right)$

11. Simplify $\frac{\cos(270 - A).\tan(90 + A).\sin(180 + A)}{\sin(270 + A).\cos(180 + A).\sin(360 + A)}$.

12. If $x^2 - \left(2 + \operatorname{cosec}^2 \frac{\pi}{4}\right) x - 2 \sec^2 \frac{\pi}{3} = \cos 90^\circ$. Show that x = 4,-2.

13. If $x \sin 45^\circ \,.\tan 60^\circ = \frac{\sin 30^\circ.\cot 30^\circ}{3 \cos 60^\circ.\operatorname{cosec} 45^\circ}$ Show that $x = \frac{1}{3}$.

14. If $\sin \theta = \frac{-3}{5}$ and θ lies in the IV Quadrant Then find the value of $\frac{3 \tan \theta - 4 \cos \theta}{4 \tan \theta + 3 \cos \theta}$

15. Show that $x = \frac{7}{2}$ If $x = \sec 30^\circ \,.\tan 60^\circ + \sin 45^\circ \,.\operatorname{cosec} 45^\circ + \cos 30^\circ \,.\cot 60^\circ$

16. If $\sin \theta = \frac{-8}{17}$ and $\pi < \theta < \frac{3\pi}{2}$ .Find the value of $\frac{\tan \theta - \cos \theta}{\sec \theta + \operatorname{cosec} \theta}$

17. If $\sin \theta = \frac{11}{61}$ and $90 < \theta < 180$. Find the value of $\cos \theta$, $\tan \theta$ and $\sec \theta$.

18. If $\tan A = \frac{12}{13}$ and $270 < A < 360$ .Find the value of $\frac{3 \sin A - 2 \cos A}{9 \cos A + 4 \sin A}$.

Chapter 15: CO-ORDINATE SYSTEM IN A PLANE

One Mark Questions:

1. Which quadrant does The point (9,8) lies?
   a) I quadrant b) II quadrant c) III quadrant d)IV quadrant
2. The reflection of the point (2,4) about the origin is
   a) (2,-4) b) (-2,4) c) (-2,-4) d) (0,0)
3. The distance between (0,0) and (-3,-4)
   a) 5 b) -5 c) 25 d) -25
4. The mid point of the line segment joining (2,-4) and (0,0) is
   a) (1,-2) b) (-1,2) c) (1,2) d) (-1,-2)
5. The centroid of the triangle with vertices A(2,-4) , B(-2,4) , C(9,12)
   a) (5,-2) b) (3,4) c) (-3,2) d) (-3,4)
6. Find the distance of the point(-4,2) from the x axis
7. Find the distance of the point(5, 3) from the origin
8. Find the distance of the point (0,3)from the y axis
9. Find the distance between the points (3,4) and (8,16)
10. Find the image of the point (8,9) with respect to x axis

Two Marks Questions:

1. Find the values of k if the distance between (2k,5) and (-k,4) is $\sqrt{90}$.
2. If the distance between the points (3,-2) and (-1,a) is 5 units. Find the value of a.
3. Find the co-ordinates of the other end of the diameter if on end of the diameter of the circle is (1,3) and the centre of the circle is (4,-2)
4. The centroid of the triangle ABC is the point (4,3). The co-ordinates of A is (5,-4) and B is (-1,6). Find the co-ordinates of C.
5. Find the coordinates of the point P(1,2) which divides the line segment joining (3,4) and (-6,2) internally

Three Marks Questions:

1. Find the perimeter of the triangle formed by the points (3,-1) , (5,2) , (-1,2).
2. Find the area of the triangle whose vertices are A (6,-4) ,B (-2,5), C (6,2).
3. Find the points of trisection of the line joining the points (3,4) and (5,-2).
4. Show that the following points are the vertices of a square and hence find the area (3,2) , (0,5) , (-3,2) , (0,-1) .
5. Prove that the following points form a rhombus. Also find the area (3,6) , (4,-1) , (7,3) , (6,6).
6. Prove that the following points form a parallelogram (0,1) , (-3,7) , (6,-9) , (9,-1)
7. Prove that the following points are the vertices of a rectangle (3,-2) , (3,1) , (5,1) , (5,-2)

Four Marks Questions:

1. Show that the points (1,-1), (5,2) and (9,5) are collinear
2. Three consecutive vertices of a parallelogram are A(3,0), B(5,2) and C(4,5). Find the fourth vertex D.
3. For what value of 'a' the points A(1,a), B(2,1) and C(4,5) are collinear

Five Marks Questions:

1. Find the circumcentre of the triangle whose vertices are (1,2) , (2,1) and (2,3) . Also find the circumradius.
2. Find the coordinates of the circumcentre of the triangle so formed by the points (1,1) , (2,-1) and (3,2).
3. Find the length of the medians of the triangle with vertices (-3,6) , (5,4) , (1,-2)
4. The midpoints of the sides of the triangle are (2,6) ,(4,6) and (3,5) . Then find the vertices of the triangle.
5. Find the ratio in which the line segment joining (2,-3) and (5,6) is divided by the y-axis. Also find the coordinates of the point of division.
6. Find the ratio in which the line segment joining the points (4,5) and (1,2) is divided by the x-axis ?Also find the coordinates of the point of the division.
7. Find the area of the quadrilateral whose vertices are: (1,2) , (6,2) , (5,3) , (3,4)

Chapter 16: LOCUS AND ITS EQUATION

One Mark Questions:

1. The equation of locus of the point which moves such that its distance from the co-ordinate axes which is in the ratio 5:3 is

   a) $5x = 3y$ b) $5x + 3y = 0$ c) $3x = 5y$ d) $5x + 3y = 0$

2. The equation the locus of the point which moves such that the sum of its distance from the co-ordinate axes is 5

   a) $x + y = 2$ b) $5x + 5y = 0$ c) $x + y = 5$ d) $5x - 5y = 0$

3. The equation the locus of the point which moves such that the sum of the square of its distances from the co-ordinate axes is 2.

   a) $x^2 + y^2 = 2$ b) $x^2 - y^2 = 2$ c) $x^2.y^2 = 2$ d) $2x^2 + 2y^2 = 0$

4. The equation of the locus of a point which moves so that its distance from the y axis is 3 times its distance from the x axis is

   a) $x = 3y$ b) $3x = y$ c) $x + 3y = 0$ d) $3x - y = 0$

5. The equation of the locus of the point equidistant from (-1, 1) and (4, 2) is

   a) $3x + 5y = 9$ b) $5x + 3y = 9$ c) $5x - 3y = 9$ d) $3x - 5y = 9$

One Mark Questions:

1. Find equation the locus of the point which moves such that its distance from (1, 2) is 3 units.
2. Find equation the locus of the point which moves such that its distance from the co-ordinate axes which is in the ratio 3:5.
3. Find equation the locus of the point which moves such that the sum of its distance from the co-ordinate axes is 7 units.
4. Find equation the locus of the point which moves such that the square of its distance from (2, 3) is 3.
5. Find equation the locus of the point which moves such that the sum of the square of its distances from the co-ordinate axes is 4.
6. Find the equation of the locus of a point which moves so that its distance from the y axis is 5 times its distance from the x axis.

Two Marks Questions:

1. Find the equation of the locus of the point which moves such that its distance from the point (-4, 0) is 4 times its distance from (0, -2).
2. Find the equation of the locus of the point which moves such that it forms a right angled triangle with the points (2, 3) and (3,4).
3. Find the equation of the locus of the point which moves such that it is collinear with the points (2, 4) and (5, 9).
4. Find the equation of the locus of the point which moves such that it lies on the perpendicular bisector of the line joining the points (-1, 5) and (2,4).
5. Find the equation of the locus of the point equidistant from (-1, 1) and (4, 2).

Three Marks Questions:

1. Find the equation of the locus of all points equidistant from e point (4, 2) and x axis.
2. Find the equation of locus of a point such that the sum of its distance from (0, 2) and (0, -2) is 6.
3. Find the equation of the locus of all points equidistant from the point (2, 4) and y axis.
4. Find the equation of the locus of the point P(x, y) such that its distance from (1, -2) is greater than 3.
5. Find the equation of the locus of points twice as far from (-a, 0) as from (a, 0).
6. Find the equation of the locus of points such that the sum of its distance from (0, 3) and (0, -3) is 8.
7. Find the locus of a point which moves so that its distances from the point A(3, 1) and B(1, 3) are in the ratio 2:3.
8. Find the equation of the perpendicular bisector of the line joining A(3, -2) and B (4, 1).
9. Find the equation of the locus of the point which moves such that it is equidistant from (4, 2) and the x axis.
10. A point P moves such that $PA^2 = 3PB^2$. If A= (5, 0) and B= (-5, 0). Find the equation of the locus of P.

Chapter 17: STRAIGHT LINE

One Mark Questions:

1. The equation of $x-axis$ is

   $a)\ x = 0$ b) $y = 0$ c) $xy = 0$ d) $x = y$

2. Equation of line passing through the point $(-4,3)$ with slope $\frac{1}{2}$ is

   a) $x - 2y + 10 = 0$ b) $x + y + 1 = 0$ c) $x - 2y = 10$ d) $x + 2y = 2$

3. The slope of the line making inclination of $60°$ with positive direction of $x-axis$.

   a) 1 b) $\frac{1}{\sqrt{3}}$ c) $\sqrt{3}$ d) $\frac{1}{2}$

4. The slope of the line passing through the points $(1,-1)$ & $(3, 5)$ is

   a) 2 b) 3 c) -3 d) -2

5. Equation of $y-axis$ is

   a) $y = 0$ b) $x = 0$ c) $x + y = 0$ d) $x = y$

6. The equation of line passing through (0,0) with slope m is

   a) $x = y$ b) $y = mx$ c) $y = mx + c$ d) $my = x$

One Mark Questions:

1. Find the slope of the line with inclination $30°$.
2. Find the slope of the line with inclination $\frac{\pi}{4}$.
3. Find the slope of line with inclination $\frac{\pi}{2}$
4. Find the slope of the line joining points $(1, 2)$ and $(-1, -2)$.
5. Write the equation of the line which is parallel to x-axis and at a distance of 5 units below the x-axis.
6. Find the slope of $\sqrt{3}x + y + 2 = 0$.
7. Reduce $2x + 3y = 7$ to slope intercept form.
8. Reduce $\sqrt{3}x + y + 8 = 0$ to intercept form.
9. Find slope of $3x + 5y - 11 = 0$.

10. Find the Centroid of the triangle formed by the points $(2,4)$ $(5,3)$ and $(8,3)$.

Two Marks Questions:

1. Find the equation of the line parallel to $x\ axis$ and at distance of $+7$ from it.
2. Find the equation of the line passing through $(4,3)$ and with slope 2.
3. Find the equation of the line passing through $(3,5)$ and making an angle $45°$ with the positive x-axis.
4. Find the value of a if the slope of the line joining the points $(3,a)$ and $(4,3)$ is $\frac{7}{2}$.
5. Show that the points $(5,-1)$ and $(-3,4)$ lie on either side of the line $6x - 5y + 1 = 0$.
6. Show that the points $(0,0)$ and $(1,-1)$ lie on the same side of the line $4x - 7y + 1 = 0$.
7. Determine the position of the points $(0,0)$ and $(1,-1)$ with respect to the line $2x + 4y - 1 = 0$.
8. Find the distance between the parallel lines $4x - 3y - 2 = 0$ and $4x - 3y - 6 = 0$.
9. Find K so that the distance from $(2,3)$ to the line $8x + 15y + K = 0$ may be equal to 4 units.
10. Find the equation of the line joining the points $(-1,-3)$ and $(6,11)$.
11. Show that the points $A(4,-2), B(2,-4)$ and $C(7,1)$ are collinear using slope method.
12. Find the points of intersection of lines $x + 5y + 4 = 0$ and $3x - 4y - 7 = 0$.
13. Write the equation of the line which has $x\ intercept = 3$ and $y\ intercept = 5$.
14. If $(3,a)$ lies on the line joining $(1,-4)$ and $(-2,5)$ find a.
15. Find the length of the perpendicular from $(-3,2)$ to the line $12x - 5y + 7 = 0$.

Three Marks Questions:

1. Derive equation of a line in two-point form.
2. Derive slope intercept form of line $y = mx + C$. Also write the equation of passing through origin with slope m.
3. Find the distance between the parallel lines $5x + 12y - 19 = 0$ and $5x + 12y + 7 = 0$.

4. Find the equation of the line which passes through the point $(-4, 5)$ and whose intercepts are equal in magnitude but opposite in sign.
5. Show that the line joining $(2, -3)$ and $(-5, 1)$ is parallel to the line joining $(7, -1)$ and $(0, 3)$.
6. Find the equation of the line passing through $(2, -3)$ which cuts off intercepts on x and y axes which are in the ratio $3:4$.
7. Find the equation of the line parallel to $2x + 3y + 1 = 0$ and passing through$(-1, 1)$.
8. Find the equation of the line perpendicular to $3x - 2y + 1 = 0$ and passing through $(1, -2)$.
9. Find K, if the line $(K + 1)x + (2K + 3)y + 3 = 0$ and $2x - 5y + 1 = 0$ are perpendicular to each other.
10. Find the equation of the line through the point of intersection of and $2x - 5y = 1$ and $3x - 2y = 8$ and parallel to the line $2x + y = 3$.
11. Find the value of a, if the lines $x - 2y = 1$, $2x + y = 7$ and $ax - 5y = 4$ are concurrent.

Four Marks Questions:

1. Prove that the lines $x + y + 4 = 0$, $2x = 3y + 7$ and $3x + y = -6$ are concurrent. Also find the point of concurrency.
2. If the line $2x + 3y = -1$ cuts the x and y axis at A and B respectively. Find the area of the triangle OAB.
3. Find the equation of line passing through the intersection of the line $2x + 3y = 5$, $7x - y = 6$ is perpendicular to the line $3x + 4y + 1 = 0$

Five Marks Questions:

1. Find the equation of the medians of the triangle whose vertices are $A(2, 3), B(-1, -4), C(5, -2)$.
2. Find the equations of the medians of the triangle formed by the points $(-1, 3), (-3, 5)$ and $(7, -9)$.

3. Find the equation of the line passing through the point of intersection of $2x + 4y = 3$ and $x + 5y = 1$ and making equal positive intercepts on the co ordinate axes.
4. Find equation of a line passing through the point $(2, 2)$ such that the sum of its intercepts on the axes is equal to 9.
5. In what ratio is the line joining the points $(2, 3)$ and $(4, -5)$ is divided by the line joining $(6, 8)$ and $(-3, 2)$.
6. Find the equation of the line which passes through the intersection of the lines $x - 2y + 4 = 0$ and $4x - 3y + 1 = 0$ and is inclined at an angle $135°$ with the x-axis.
7. Find the foot of the perpendicular drawn from the point $(-2, -1)$ on the line $3x + 2y - 5 = 0$.
8. Find the image of the point $(2, 4)$ on the line $x + y - 10 = 0$.
9. Find the reflection of the point $P(2, 1)$ in the line $x + y = 5$.
10. Find the equation of the line passing through the points of intersection of points $2x + 3y - 7 = 0$ and $5x + 6y + 8 = 0$ and the point $(4, 3)$.
