**CLASS: XI**

**SUBJECT: MATHEMATICS**

* **Chapter 1: Sets**

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| **Sr. No.** | **Knowledge Based** | **Date**  |
| K1. | If A = {1, 2, 3, 4, 5} and B= {2, 4, 6, 8}. Find A – B  | 19.04.14 |
| K2. | Let U= {1, 2, 3, 4, 5, 6, 8}, A= {2, 3, 4}, B= {3, 4, 5}. Show that (A $∪$ B)’ = A’ $∩$ B’ and (A $∩$ B)’ = A’ $∪$ B’ | 19.04.14 |
| K3. | List all the possible subsets and proper subsets of the set {a, b, c} | 22.04.14 |
| K4. | State whether the following statements are true or false:1. {a, b} = {a, a, b, b, a}
2. The set {x$ \in $N, x + 8 = 8} is a null set.
3. {a, b, c} and {x, y, z} are equivalent sets.
4. Every set has a proper subset.
5. Set of prime numbers and set of numbers divisible by 3 are disjoint sets.
6. The power set of a given set is a set of all subsets of the set.
 | 26.04.14 |
| **S. No.** | **Understanding Based** |  |
| U1. | Let A and B be sets. If A $∩$ X = B $∩$ X = $∅ $and A $∪$ X = B $∪$ X for some set X, show that A = B. | 24.04.14 |
| U2. | In a group of 1000 people, 750 persons are environmental friendly and 400 persons are concerned about saving natural resources. How many are environmental friendly only? How many are concerned about saving resources only?  | 26.04.14 |
| U3.  | In a hostel, there are 400 students. Out of these, 250 joined NCC and 200 joined EXTEND HELPING HAND, whereas 50 take neither of these. How many students joined NCC and the group EXTEND HELPING HAND? | 26.04.14 |
| U4. | Let A, B and C be the three sets. If A $∩$ B = A $∩$ C $ $and A $∪$ B = A $∪$ C, show that B = C. | 24.04.14 |
| **S. No.** | **Application** |  |
| A1.  | “Difference of sets A and B, A – B, is same as compliment of set B.” Comment. | 22.04.14 |
| A2. | From 50 students taking examinations in Mathematics, Physics and Chemistry, each of the student has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 M and C and at most 20 P and C. What is the largest possible number that could have passed all three examinations?  | 28.04.14 |
| A3.  | Let set A has 4 elements and set B has 6 elements. What can be the minimum number of elements in A $∪$ B? | 24.04.14 |
| A4. | Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find the values of m and n. | 28.04.14 |
| **S.No.** | **HOTS** |  |
| H1. | Suppose S1, S2, .... S30 are thirty sets with 5 elements each and S1’, S2’ ...... Sn’ are n sets with 3 elements each. Let $\bigcup\_{i=1}^{30}S\_{i}= \bigcup\_{j=1}^{n}S'\_{j}=S.$ Assume that each element of S belongs to exactly 10 of the S’s and exactly 9 of the Sj’s. Find n  | 28.04.14 |
| H2. | If set A = {1}. How many elements P[P{P(A)}] contains? | 26.04.14 |
| **S.No.** | **VALUE BASED** |  |
| V1. | Represent the set of letters of the words ‘LIFE SKILLS’ in roaster form? Write the set of four life skills you would like to acquire. | 22.04.14 |
| V2. | Let set A represent the people following the principles of Mahatama Gandhi and set B represents people following path of violence. Can you say set A and B are mutually exclusive? Which is your favourite set of the two and why? | 22.04.14 |
| * **Chapter 2: Relations and Functions**
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| **S.No.** | **Knowledge Based** | **Date** |
| K1. | Determine the domain and range of the relation R, where R = {(x, x3): x is a prime number less than 10} | 02.05.14 |
| K2. | Define greatest integer and Signum function. Also, draw their graph. | 02.05.14 |
| K3. | Let A = {1, 2, 3, 4, 5,..., 19,20}. Define a relation R from A to A by R = {(x, y): 3x – y= 0, where x, y $\in $ A}. Write R in roaster form and hence find its domain, range and co-domain. | 05.05.14 |
| K4. | Is the given relation a function? Give reasons for your answer.1. H = {(4, 6), (3, 9), ( - 11, 6), (3, 11)}
2. F = {(x, x): x is a real number}
3. G = {(n, 1/n: n is a positive integer}
4. T = {(x, 3): x is a real number}
 | 05.05.14 |
| **S. No.** | **Understanding Based** |  |
| U1. | Is g = {(1, 1), (2, 3), (3, 5), (4, 7)} a function? If this is described by the formula, g(x) = α x + $β$, then what values should be assigned to α and $β$ | 07.05.14 |
| U2. | Let A = {1, 2, 3, 4} and B= {1, 2} and C = {4, 5, 6}, find1. A × (B $∩$ C)
2. (A × B) $∩$ (A × C)
 | 03.05.14 |
| U3.  | Let A= {a, b} and B= {c, d}. How many relations are possible from set A to B? | 03.05.14 |
| U4. | If f(x) = $\frac{x-1}{x+1}$, then show that: (1.) f(1/x) = - f(x) (2.) f(-1/x) = - 1/f(x)  | 03.0514 |
| **S. No.** | **Application** |  |
| A1. | If f(x) = y = $\frac{ax-b}{cx-a}$, then prove that f(y) = x | 08.05.14 |
| A2.  | For a non-zero x, p f(x) + q f(1/x) = $\frac{1}{x}- 5$, where p ≠ q. Find f(x). | 08.05.14 |
| A3. | If f(x) = $\frac{5x+3}{4x-5}$, show that f(x) is an identity function. | 09.05.14 |
| A4. | Show that f(x) = x2 + cos x, is an even function. | 09.05.14 |
| **S. No.** | **Value Based** |  |
| V1. | Given set A = {honest, violence} set B= {peace, prosperity, hatred, destruction}. Write the set A × B, choose one element of A × B which you would like to have in life. | 02.05.14 |
| V2. | Success(S) in life is a linear function of values (V) in life which we have acquired. Represent S as a function of V. Do you agree? Mention two life skills. | 02.05.14 |
| **S.No.** | **HOTS** |  |
| H1. | If f(x) = $\frac{1+x}{1-x}$, show that $\frac{f\left(x\right).f(x^{2})}{1+[f\left(x\right)]^{2}}= \frac{1}{2}$ | 10.05.14 |
| H2. | If A and B are two non empty sets having n elements in common. Prove that A × B and B × A have n2 elements in common. | 10.05.14 |

* **Chapter 3: Trigonometric Functions**

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| **Sr. No.** | **Knowledge Based** | **Date**  |
| K1. | Express each of the following angles in sexagesimal system:1. $\frac{π}{5}$ b.) $\frac{1}{4}$ c.) – 3
 | 28.06.14 |
| K2. | Express each of the following in radian measure:1. 300° b.) 5°37’30” c.) – 32°30’
 | 28.06.14 |
| K3. | Find the value of each of the following:1. tan ( - 1125°) b.) sin $\frac{5π}{3}$ c.) cot 225°
 | 28.06.14 |
| **S. No.** | **Understanding Based** |  |
| U1. | Prove the following:1. tan $\frac{11π}{3}- 2\sin(\frac{2π}{3}- \frac{3}{4}cosec^{2}\frac{π}{4}+ 4cos^{2}\frac{17π}{6}= \frac{3-4\sqrt{3}}{2})$
2. $\frac{2\sin(\left(α-γ\right)cosγ-sin⁡(α-2γ))}{2\sin(\left(β-γ\right))cosγ-sin⁡(β-2γ)}= \frac{sinα}{sinβ}$
 | 30.6.14 |
| U2. | Find the general solutions of the following:1. 7 cos2x + 3 sin2x = 4
2. sin mx + sin nx = 0
3. cos x+ cos 2x + cos 3x = 0
4. tan2x + (1 - $\sqrt{3}$) tan x - $\sqrt{3}$ = 0
 | 3.7.14 |
| U3.  | If tan A = ¾ and cos B = 9/11, where $π$<A<$\frac{3π}{2}$; 0<B<$\frac{π}{2}$, find the value of tan (A+B) | 1.7.14 |
| U4. | Prove: sin2a + sin2(a – b) – 2 sin a.cos b.sin(a – b) = sin2b | 1.7.14 |
| **S. No.** | **Application** |  |
| A1.  | If tan x = b/a, then find the value of: $\sqrt{\frac{a+b}{a-b}}$ + $\sqrt{\frac{a-b}{a+b }}$ | 2.7.14 |
| A2. | An angle α is divided into two parts such that the ratio of the tangents of the two parts is equal to k and the difference of the two parts is equal to x, show that sinx = $\frac{k-1}{k+1}\sin(α)$ | 2.7.14 |
| A3.  | If tan $\frac{A}{2}$ = $\sqrt{\frac{1-c}{1+c } }\tan(\frac{B}{2}) , $show that cos B = $\frac{\cos(A-c)}{1-c\cos(A)}$ | 4.7.14 |
| A4. | If $\frac{2\sin(α)}{1+\cos(α+\sin(α))}=y$, then prove that $\frac{1-\cos(α+\sin(α))}{1+\sin(α)}$ is also equal to y. | 4.7.14 |
| A5. | If 2 tan a = 3 tan b, prove that tan (a – b) = $\frac{\sin(2 b)}{5-\cos(2b)}$ | 4.7.14 |
| **S. No.** | **Value Based** |  |
| V1. |  A student is in a jungle and wants to know the Sun’s altitude at a particular moment. How he can use trigonometry for the same? If he has calculated correctly, what type of value quality he has acquired? | 2.7.14 |
| **S.No.** | **HOTS** |  |
| H1. | If a cos $θ$ - b sin $θ$ = c, show that a sin $θ$ + b cos $θ$ = $\pm \sqrt{a^{2}+ b^{2 }+ c^{2}}$ | 3.7.14 |
| H2. | If α and $β$ are two distinct roots of a tan$θ$ + b sec$θ$= c, prove that tan ($α + β$) = $\frac{2ac}{a^{2}- c^{2}}$  | 5.7.14 |
| H3. | If sin $θ+\sin(∅)$ = a and cos $θ$ + cos $∅$ = b, find the values of tan $\frac{θ+ ∅}{2},\tan(\frac{θ-∅}{2}.)$ | 5.7.14 |
| * **Chapter 4: Mathematical Induction**
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| **S.No.** | **Knowledge Based** | **Date** |
| K1. | If P(n) is a statement “n(n +1)(n +2) is divisible by 12”. Show that the statements P(3) and P(4) are true but not P(5).  | 7.7.14 |
| **S. No.** | **Understanding Based** |  |
| U1. | Prove by mathematical induction:1. n(n2 – 1) is divisible by 24 where n is an odd number greater than 2
2. 2n < (n + 2)$!$ for all natural number n.
 | 8.7.14 |
| **S. No.** | **Application** |  |
| A1.  | A sequence b0, b1, b2..... is defined by letting b0 = 5 and bk = + bk – 1 for all natural numbers k. Show that bn = 5 + 4n for all natural numbers n | 9.7.14 |
| **S.No.** | **HOTS** |  |
| H1. | Prove that the number of subsets of a set containing n distinct elements is 2n, for all n $\in $ N | 9.7.14 |
| H2. | Prove by induction:cosα.cos2α.cos4α.........cos(2n – 1α) = $\frac{\sin((2^{n}α))}{2^{n}\sin(α)}$ | 9.7.14 |

* **Chapter 5: Complex Numbers**

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| **Sr. No.** | **Knowledge Based** | **Date** |
| K1. | Express each in the form (a + $ι$b):1. $ι$15 – 3$ι$7 + 2$ι$109 + $ι$100 – $ι$17 + 5$ι$3
2. $\sqrt{- 4}\left( \sqrt{-9}+ 3\right)+\sqrt{-49}\left(i^{3}+ \sqrt{3}\right)- \sqrt{-36}(2- \sqrt{-121)}+ \sqrt{5}i^{5}$
 |  |
| K2. | Find the conjugate of the following:1. (5 + $\sqrt{2}i$)2
2. $\sqrt{-3}+ 4i$ 2
 |  |
| K3. | Find the multiplicative inverse of the following:1. (2 – $ι$)(3 + $ι$)
2. $\frac{2+3ι}{3-2ι}$
 |  |
| K4. | Solve for x and y:1. 3x + (2x – y) $ι$ = 6 – 3$ι$
2. (x – $ι y$)(2 + 3$ι$) = $\frac{x+2i}{1-i}$
 |  |
| **S. No.** | **Understanding Based** |  |
| U1. | If z = 2 – 3i, prove that z2 – 4z + 13 = 0 |  |
| U2. | Find the value of z3 + 7z2 – z + 16, where z = 1 + 2i |  |
| U3.  | Solve for z, the equation |z|+ z = 2 + i |  |
| U4. | Where does z lies, if |$\frac{z-5i}{z+5i}|$ = 1 |  |
| **S. No.** | **Application** |  |
| A1.  | If z = x + iy and z2 = a + ib where a, b, x, y are real numbers, show that 2x2 = $\sqrt{a^{2}+b^{2}}$ + a |  |
| A2. | If a = cos α + i sinα, find the value of $\frac{1+a}{1-a}$ |  |
| A3.  | Find x and y for which the complex numbers – 3+ ix2y and x2 + y + 4i are conjugate of each other. Given x, y $\in $ R. |  |
| **S.No.** | **HOTS** |  |
| H1. | If iz3 + z2 – z + i = 0, show that |z| = 1 |  |
| H2. | If |z1| = |z2|=.....=|zn|= 1, prove that |z1 + z2 +.....zn| = |1/z1 + 1/z2 + ....+ 1/zn| |  |
| **S.No.** | **Value Based** |  |
| V1.  | If in U4 question, a person is represented by complex number z = x + iy. If a person represented only by x is not sensitive towards environment and if a person is represented only by y then he is sensitive towards environment. Do you think that the person is Eco- friendly? |  |
| V2. | If 1 is considered almost perfect. How many minimum value qualities are required for the expression ($\frac{1+i}{1-i}$)m to be almost perfect. Mention four value qualities. |  |
|  | * **Chapter 6: Linear Inequalities**
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| **S.No.** | **Knowledge Based** |  |
| K1. | Solve the inequalities:1. |$\frac{2(3-x)}{5}| < \frac{9}{5}$ b.) 5x – 7 < 3(x + 3), 1 – 3x/2 $\geq $ x – 4
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| **S. No.** | **Understanding Based** |  |
| U1. | Draw the graphical solution of each of the following questions:1. 2x + y $\leq 24, x+y \leq 1, 2x+5y\leq 40, x\geq 0, y\geq 0$
2. 2x – y > 1, x – 2y < - 1
 |  |
| **S. No.** | **Application** |  |
| A1.  | A company manufactures cassettes. Its cost and revenue function are C(x) = 26,000 + 30x and R(x) = 43x, respectively, where x is the number of cassettes produced and sold in a week. How many cassettes must be sold by the company to realise some profit? |  |
| A2. | The water activity in a pool is considered normal when the average pH reading of three daily measurements is between 8.2 and 8.5. If the first two pH readings are 8.48 and 8.35, find the range of pH value for the third reading that will result in the activity level being normal.  |  |
| **S.No.** | **Value Based** |  |
| V1. | A milk of 80% concentration is diluted at home by the seller by adding some water to it so that milk concentration is reduced between 65% to 70%. If 640 litres of milk of 80% concentration is available, how much water has been added? Which value system the seller is lacking? |  |

* **Chapter 8: Binomial Theorem**

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| **Sr. No.** | **Knowledge Based** | **Date** |
| K1. | Expand the following: (a) $(\frac{2x^{2}}{3}- \frac{3}{2x}$)4; (b) (2x2 + 3y)5 | 6.08.14 |
| K2. | Which number is larger: (1.2)4000 or 800? | 6.08.14 |
| K3. | Find the seventh term in the expansion of (2x3 - $\frac{3}{2x}$)10 | 8.08.14 |
| K4. | Find the coefficient of x4 in the expansion of the product(a) (1+2x)4(2 – x)5 (b)x-17 in the expansion of (x4 - $\frac{1}{x^{3}}$)15 | 8.08.14 |
| **S. No.** | **Understanding Based** |  |
| U1. | Expand the following: (a) (x + 2y – 3z)n; (b) (1 – x + x2)4  | 6.08.14 |
| U2. | Using binomial theorem prove that: 32n+2 – 8n – 9 is divisible by 64, for all n$\in N$ | 7.08.14 |
| U3.  | Find the sixth term of the expansion (y1/2+ x1/3)n, if the binomial coefficient of the third term from the end is 45. | 14.08.14 |
| U4. | Find the term in (2x2 + 1/x)12 which is independent of x. | 8.08.14 |
| U5. | Find out the sum of the coefficient in the expansion of (15p – 4q)n, where n is a positive integer. | 16.08.14 |
| **S. No.** | **Application** |  |
| A1.  | If the coefficients of 5th, 6th and 7th terms in the expansion of (1+x)n are in A.P., then find the values of n. | 14.08.14 |
| A2. | If the coefficients of 4th and 13th terms in the expansion of (x2 + $\frac{1}{x}$)n are equal, then find the term which is independent of x. | 14.08.14 |
| A3.  | In the expansion of (x + a)n, the sums of the odd and even terms are P and Q respectively, prove that:1. P2 – Q2 = (x2 – a2)n
2. 2(P2 + Q2) = (x + a)2n + (x – a)2n
3. 4PQ = (x+a)2n – (x – a)2n
 | 16.08.14 |
| A4. | If 3rd, 4th, 5th and 6th terms in the expansion of (x+y)n be a,b,c and d respectively, prove that $\frac{b^{2}- ac}{c^{2}- bd}= \frac{5a}{3c}$ | 16.08.14 |
| A5. | If the coefficients of x, x2 & x3 in the binomial expansion of (1 + x)2n are in A.P., prove that 2n2 – 9n + 7 = 0 | 17.08.14 |
| **S.No.** | **HOTS** |  |
| H1. | Find the number of terms in the expansion of1. (a+2b – 3c)n
2. (1+2x+x2)20
 | 16.08.14 |
| H2. | Prove that there is no term involving x8 in the expansion of (2x2 – 3/x)11 | 14.08.14 |
| H3. | Find k, such that 405 is independent term, in the expansion of ($\sqrt{x}$ + $\frac{k}{x^{2}}$)10 | 8.08.14 |
| H4. | If Tr is the rth term in the expansion of (1+x)n in the ascending powers of x, prove that r(r+1) Tr+2 = (n – r+1)(n – r)x2 Tr | 17.08.14 |
|  | * **Chapter 10: Straight Lines**
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| **S.No.** | **Knowledge Based** | **Date** |
| K1. | What is the value of y so that the line through (3, y) and (2, 7) is parallel to the line segment through (7, 4) and (10, 6)? |  |
| K2. | If the points (a,0), (0,b) and (3,4) are collinear, show that $\frac{3}{a}+ \frac{4}{b }=1$ |  |
| K3. | Find the equation of the straight lines, which pass through the point (3, 4) & have intercepts on the axes:1. Equal in magnitude but opposite in sign.
2. Such that their sum is 14.
 |  |
| K4. | Find the equation of the right bisector of the line segment joining the points (1, 0) & (2, 3) |  |
| K5. | Show that the path of a moving point such that its distance from the lines:3x – 2y = 5 and 3x + 2y = 5 are equal is a straight line |  |
| **S. No.** | **Understanding Based** |  |
| U1. | The coordinates of two points A and B are (- 1, 4) and (5, 1) respectively. Find the coordinates of the point P which lie on extended AB such that it is three times as far from B as from A.  |  |
| U2. | In what ratio is the line segment joining the points A (2, -3) and B (5,6) is divided by x-axis? Also, find the coordinates of the point of division. |  |
| U3.  | Find the equation of a line which passes through the point (2, 9) and making an angle of 45° with x-axis. Also, find the points on the line which are at a distance of (i) 2 units, (ii) 5 units from (2, 9) |  |
| U4. | Prove that the altitudes of a triangle are concurrent |  |
| U5. | Find the coordinates of the orthocentre of the triangle whose angular pointsare (1, 2) (2, 3) & (4, 3) |  |
| **S. No.** | **Application** |  |
| A1. | Obtain the co-ordinates of the feet of perpendiculars drawn from the originupon the lines 3x – 5y + 2 = 0 & 4x – 3y + 5 = 0 and show that the equation ofthe straight line joining these feet is 26x + 53y = 11 |  |
| A2.  | If A and A’ be the points (5, 0) & (-5, 0) respectively. Find the equation of theset of all points p(x, y) such that |AP| - |A’P| = 6 |  |
| A3. | A line forms a triangle with co-ordinate axes. If the area of this triangle is54√3 square units and the perpendicular drawn from the origin to the linemakes an angle of 60 with x-axis, find the equation of the line. |  |
| **S.No.** | **Value Based** |  |
| V1. | Aadya and Nitya planted some trees in a square garden on the following points (2,1);(4,3);(6,7) and (2,3);(3,4);(4,6) respectively, both arguing that they have planted them in a straight line. Find out who is correct? Justify your decision. Are the two girls contributing anything to the society? Justify  |  |
| V2. | The students of class XI of a school undertake to work for the campaign ‘Say no to plastic’ in a city. They took the map of the city and form coordinate plane on it to divide their areas. Group A took the region covered between the coordinates (1,1);(- 3,2); (-2,-2) and (1, -3) taken in order. Find the area of the region covered by group A.1. What are the harmful effects of using plastic?
2. How can you contribute in spreading awareness for such campaign?
 |  |
| **S.No.** | **HOTS** |  |
| H1. | A ray of light passing through the point A(1,2) reflects in x-axis at a point P and the reflected ray passes through the point B(5,3). Find the coordinates of P. |  |
| H2. | Vertices of a quadrilateral ABCD are A (- 4, 2), B (2, 6), C (8, 5) and D (9, - 7). Show that the mid points of the sides of a quadrilateral form a parallelogram |  |

* **Chapter 9: Sequence and series**

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| **Sr. No.** | **Knowledge Based** | **Date**  |
| K1. | If a, b, c, are in A.P. Prove that: (i) (ab)-1, (ca)-1, (bc)-1 are also in A.P. (ii)a(b+c)/bc, b(c+a)/ca, c(a+b)/ab are in A.P |  |
| K2. | Prove that the product of first n terms of a G.P., whose first term is ‘a’ and last term is l is (al)n/2 |  |
| K3. | Find the sum of n terms of the following series1. 1.3.5 + 2.4.6 + 3.5.7 + \_\_\_\_\_\_\_ to n terms
2. 6 + 9 + 21 + 69 + 261 + \_\_\_\_\_\_\_\_
 |  |
| K4. | Find the sum of n terms:(i) 4 + 44 + 444 +\_\_\_\_\_\_\_\_(ii) 7 + 7.7 + 7.77 + 7.777 +\_\_\_\_\_\_\_\_\_\_ |  |
| **S. No.** | **Understanding Based** |  |
| U1. | If 7 times the 7th term of an A.P. is equal to 11 times its 11th term, show thatthe 18th term of the A.P. is zero. |  |
| U2. | If an A.P., the third term is p & 4th term is q, find the 10th term and generalterm. |  |
| U3.  | If a, b, c, d are in G.P. show that:1. a + b, b + c, c + d are in G.P.
2. an + bn, bn + cn, cn + dn are also in .G.P.
 |  |
| U4. | Show that sum of first n even numbers is equal to (1+1/n)times the sum of first n odd numbers |  |
| U5. | Show that the sum of n consecutive odd, integers beginning with 1 equalsn2. |  |
| **S. No.** | **Application** |  |
| A1.  | Find the 21st and 42nd terms of the sequence defined bytn = 0, if n is odd 1, if n is even |  |
| A2. | Which term of the sequence:20, 19 1/3, 18 ½,17 ¾ \_\_\_\_\_\_\_\_is the first negative term. |  |
| A3.  | Which term of the sequence 8-6i, 7-4i, 6-2i,\_\_\_\_\_\_\_\_\_\_is pure imaginary. |  |
| A4. | If ‘S’ is the sum of a finite A.P. whose first term is ‘a’ and last term is l. Showthat its common difference is equal to (l2 –a2)/(2s-a-l) |  |
| A5. | If the coefficients of x, x2 & x3 in the binomial expansion of (1 + x)2n are in A.P., prove that 2n2 – 9n + 7 = 0 |  |
| **S. No.** | **Value Based** |  |
| V1. | A person donates money to a trust working for education of children and women in some villages. If the person donates Rs. 5,000 in the first year and his donation increases by Rs. 250 per year, find the amount donated by him in the eighth year and the total amount donated in eight years.1. Which mathematical concept is being used here?
2. Write any two values the person mentioned here possess.
3. Why do you think education of women is necessary for the development of a society?
 |  |
| **S.No.** | **HOTS** |  |
| H1. | Show that the sequence:log a, log (ab), log (ab2), log (ab3),is an A.P. Find its nth term. |  |
| H2. | Find the number of terms common to two A.P.’s: 3,7,11,,……..407 &2,9,16,………..,709. |  |
| H3. | If pth term of an A.P. is q and the qth term is p, show that rth term is p+q-r. |  |
|  | * **Chapter 11 and 12: Conic Sections and 3D**
 |  |
| **S.No.** | **Knowledge Based** | **Date** |
| K1. | Find the equation of a circle which passes through (0,-1) (2,0) &has its centre on the line 3x+y=5 |  |
| K2. | Find the centre & radius of the circle 2x2+2y2=x |  |
| K3. | Find the centre & radius of the circle x2+y2-ax-by=0 |  |
| **S. No.** | **Understanding Based** |  |
| U1. | Find the equation of the hyperbola whose centre is at origin, transverse axis along x-axis, length of conjugate axis is 5 & through the pt (1,-2) |  |
| U2. | Find the equation of a circle of radius 5 whose centre lies on y-axis & passes through (3,2) |  |
| U3.  | If the pts A(1,0,-6) ,B(-3,p,q) &C(-5,9,6) are collinear, find the values of p & q |  |
| U4. | Find the equation of set of the pts whose distance from the point (2,-1,3) is 5. |  |
| U5. | .Find the co-ordinates of the pts which is equidistant from the pts (0,0,0), (a,0,0), (0,b,0), (0,0,c)  |  |
| **S. No.** | **Application** |  |
| A1.  | If the parabola y2=4px passes through pts (3,-2) find the length of latus rectum &co-ordinates of focus. |  |
| A2. | Two vertices of a triangle are(4,-2,3) ,(2,-6,4) & its centroid is (8/3,-1,3). Find the third vertex. |  |
| A3.  | Find the equation of the hyperbola whose1. vertices are (0,$\pm $7) & eccentricity =$\frac{4}{\begin{array}{c}3\\\end{array}}$
2. (ii)foci ($\pm $5,0) & length of the transverse axis is 8
 |  |
| A4. | Find the ratio in which the line segment joining the points (2,4,-3) (-3,5,4) isdivided by xy-plane |  |
| **S.No.** | **HOTS** |  |
| H1. | The girder of a railway bridge is a parabola with its vertex at the highest point ,15 m above the ends .If the span is 150 m ,find its height at 30 m from the midpoint (12.6 m) |  |
| H2. | The towers of a suspension bridge, hung in the form of a parabola, have their tops 30 m above roadway &are 200 m apart. If the cable is 5 m above the roadway at the centre of the bridge, find the length of the vertical supporting cable 30 m from the centre. (7.25 m) |  |
| H3. | A line is such that its segment between the lines 5x – y+ 4 and 3x + 4y =4 is bisected at a point (1, 5). Find the equation of the line. |  |
| H4. | Vertices of a quadrilateral ABCD are A (- 4, 2), B (2, 6), C (8, 5) and D (9, - 7). Show that the mid points of the sides of a quadrilateral form a parallelogram |  |

* **Chapter 13 & 14: Calculus& Mathematical Reasoning**

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Knowledge Based** | **Date** |
| K1. | Evaluate: (a) $\lim\_{x\to 1}(x+3)$ |  |
| K2. | Evaluate: $\lim\_{x\to 0}\frac{ax+b}{cx+1}$ |  |
| K3. | Evaluate: $\lim\_{x\to 2}\frac{x^{3}- 8}{x-2}$ |  |
| K4. | Evaluate: (a) $\lim\_{x\to 1}\frac{x^{3}- 3x+1}{x-1} \left(b\right)\lim\_{x\to 0}\frac{x}{\sqrt{1+x}-1}$ |  |
| **S. No.** | **Understanding Based** |  |
| U1. | $\lim\_{x\to 3}$(xn -3n )/(x-3) =108, then find n |  |
| U2. | $\lim\_{x\to 0}$(sin ax/sin bx)n  |  |
| U3.  | Find the derivative by using first principle: (i) 1/x2 (ii) x+1/x  |  |
| U4. | Write the converse & contra positive of (i) I go to beach whenever it is hot(ii)If you do not work hard then you will fail(iii)If it is cold then it will snow |  |
| U5. | Check whether ‘or’ used is inclusive or exclusive ,give reason (i)You are wet when it rains or you are in river (ii)A number is positive or negative |  |
| **S. No.** | **Application** |  |
| A1.  | If f(x)= 5x-4 ,x≤1 4x2 -3x, x≥1 find $\lim\_{x\to 1}$f(x) |  |
| A2. | If f(x)= x, 0≤ x <1/2 0, x=1/2 x-1,1/2<x≤1Check $\lim\_{x\to 1/2}$f(x) exist or not |  |
| A3.  | Find the derivative by using first principle:1. $\sqrt{\cos(x)}$ (b) x sinx
 |  |
| A4. |  Prove √5 is irrational |  |
| **S.No.** | **HOTS** |  |
| H1. | Prove that n is odd iff n2 is odd |  |
| H2. | Prove that n is even iff n2 is even |  |
| H3. | If f(x)= (x-|x|) /x, x≠0 -2 , x=0Find the $\lim\_{x\to 0}f(x)$ |  |
| H4. | Find the derivative of the following functions:1. x sinx/(1+cos x) (b) √sin (x2+x)
 |  |
|  | * **Chapter 15: Statistics**
 |  |
| **S.No.** | **Knowledge Based** | **Date** |
| K1. | Find the mean deviation from the mean as well as from median of the following distribution:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CLASS | 2 – 4 | 4 – 6 | 6 – 8 | 8 – 10 |
| FREQUENCY | 3 | 4 | 2 | 1 |

 |  |
| K2. | The frequency distribution of population of males in different age groups in given below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Age group in years | 5 – 14 | 15 – 24 | 25 – 34 | 35 – 44 | 45 – 54 | 55 – 64 | 65 – 74 |
| No. of males(in lakhs) | 447 | 307 | 279 | 220 | 157 | 91 | 39 |

 Calculate mean deviation about median age. |  |
| **S. No.** | **Understanding Based** |  |
| U1. | Find the mean deviation from the mean, as well as from the median for the series: 1,2,3,4,5,6,7. |  |
| U2. | Find the mean and variance of the following data by using step deviation method:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classes | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 |
| Frequency | 20 | 24 | 32 | 28 | 20 | 11 | 26 | 15 | 24 |

 |  |
| U3.  | Find the mean, variance and standard deviation using short cut method:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Height (cm) | 70-75 | 75-80 | 80-85 | 85-90 | 90-95 | 95-100 | 100-105 | 105-110 | 110-115 |
| No. of children | 3 | 4 | 7 | 7 | 15 | 9 | 6 | 6 | 3 |

 |  |
| **S. No.** | **Application** |  |
| A1.  | Calculate the standard deviation from the following data:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mid-point | 5 | 15 | 25 | 35 | 45 | 55 | 65 | 75 |
| Frequency | 5 | 8 | 7 | 12 | 28 | 20 | 10 | 10 |

 |  |
| A2. | The annual rainfall in centimeters at a place A over the period 1999 to 2004 was as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| YEARS | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| RAINFALL(cm) | 73 | 79 | 111 | 79 | 55 | 59 |

 Calculate standard deviation |  |
| **S.No.** | **Value Based** |  |
| V1. |  |  |
| V2. |  |  |
| **S.No.** | **HOTS** |  |
| H1. | The scores of the 10 students in a test with maximum marks 50 were as follows: 28,36,34,28,48,22,35,27,19,41 (i) Find the variance. (ii) If 2 grace marks are awarded to each student, what is the new variance? (iii) If instead, 5 marks are deducted from each student’s marks due to complaint of mass copying, what would be the variance? (iv) If instead, the marks are to be calculated out of 100, and so the marks of each student are doubled, what would be the new variance? |  |
| H2. | The mean and variance of 8 observations are 9 and 9.25 respectively. If the six observations are 6, 7,10,12,12 and 13, find the remaining two observations. |  |
| H3. | The mean and the standard deviation of 20 observations are found to be 10 and 2 respectively. On rechecking, it was found that an observation 8 was incorrect. Calculate the correct mean and correct standard deviation in each of the following cases: (i) if the wrong observation is omitted. (ii) if it is replaced by 12. |  |
| H4. | The mean and standard deviation of a group of 100 observations were found to be 20 and 3 respectively. Later on, it was found that three observations were incorrect which were recorded as 21, 21 and 18. Find the mean and standard deviation if the incorrect observations were omitted. |  |

* **Chapter 16: Probability**

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Knowledge Based** | **Date** |
| K1. | From a group of 2 boys & 3 girls, two children are selected at random. Describe the events:* 1. A: both selected children are girls.

(ii) B: the selected group consists of one boy & one girl.(iii)C: at least one boy is selected. |  |
| K2. | The letters of the word ‘Society’ are placed at random in a row. What is theProbability that the three vowels come together? |  |
| K3. | What is the chance that a non-leap year should have 53 Sundays? |  |
| K4. | Find the range & domain of probability function. |  |
| **S. No.** | **Understanding Based** |  |
| U1. | Three unbiased coins are tossed once. Find the probability of getting1. 2 heads (b) one head or 2 heads (c) at least 2 heads (d) at most 2 heads (e) at most one head.
 |  |
| U2. | In a single throw of 2 dice, find the probability of a total of (i) an odd greater than 5. (ii) at least 10. |  |
| U3.  | A box contains 10 red marbles, 20 blue marbles & 30 green marbles. 5 marbles are drawn from the box, what is the probability that1. all will be blue.
2. at most one will be green.
 |  |
| **S. No.** | **Application** |  |
| A1.  | From a group of 2 men & 3 women, two persons are selected. Describe thesample space of the experiment. If E is the event in which one man & onewoman are selected then which are the cases favourable to E. |  |
| A2. | A box containing 100 bolts & 50 nuts. It is given that 50% bolts & 50% nutsare rusted. Two objects are selected from the box at random. Find theProbability that both are bolts or both are rusted. |  |
| A3.  | Four wins are tossed simultaneously, write the sample space and then findthe probability of getting 3 heads. |  |
| **S. No.** | **Value Based** |  |
| V1. | Arushi, Mahi and Vani were fighting t get first chance in a game. Arushi says, “Let us toss two coins. If both heads appear, Mahi will take first chance, if both tails appear, Vani will get it and if one head and one tail appear, I will get the chance.”1. Is her decision fair?
2. What quality of her character is being depicted here?
 |  |
| V2. | A school gives awards to the students of each class-5 for bravery, 3 for punctuality, 3 for full attendance, 4 for social service and 5 for self confidence. An awarded student is selected at random. What is the probability that he is being for awarded for (i) punctuality (ii) self confidence.1. Which value out of the above five is most important for the development of society? Justify.
 |  |
| **S. No.** | **HOTS** |  |
| H1. | If A, B, C are 3 events associated with a random experiment. Prove thatP(A U B U C) = P(A) + P(B) + P(C) – P(A∩B) – P(A∩C) – P(B∩C) + P(A∩B∩C) |  |
| H2. | A & B are events such that P(A) = 0.42, P(B) = 0.48 and P(A & B) = 0.16 determine.(i) P (notB) (ii) P(not A) (iii) P( A or B) |  |