XI Math’s Worksheet

Time: 60 min **Chapter#1 : Sets** **Full Marks:**

Q.1	If U = {1,2,3,4,……..,10} is the universal set for the sets A = {2,3,4,5} and B = {1,2,3,4,5,6}, then verify that (A∪B)'' = A''∩B''.
Q.2	If A = {1, 2, 3, 4, 5}, B = {1, 3, 5, 8}, C = {2, 5, 7, 8}, verify that A– (B U C) = (A–B) ∩ (A –C). (2 marks)
Q.3	Which type of set is the set of odd natural numbers divisible by 2? (1 mark)
Q.4	Out of 20 members in a family, 11 like to take tea and 14 like coffee. Assume that each one likes at least one of two drinks. how many like, only tea and not coffee?
Q.5	Decide, among the following sets are subsets of one and another : A={x : x ∈ R and x satisfy : $x^2 - 4x + 3 = 0$} B = {1,3}, C = {1,3,5}, D = {4,5,6}.
Q.6	A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product A and 450 consumers like product B. What is the leastnumber that must have liked both products?
Q.7	Let A and B be two finite sets such that n(A – B) = 30, n (A U B) = 180, n(A ∩ B) = 60, find n(B). (2 marks)
Q.8	Write the set A = {x : x ∈ N and $x^2 < 25$} in roster form. (1 mark)
Q.9	In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked (i) product C only (ii) product A and C but not product B (iii) at least one of three products.
Q.10	If A × B = {(p,q),(p,r),(m,q),(m,r)}, find A and B.
Q.11	In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I,11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find: (5 marks) (i) the number of people who read at least one of the newspapers. (ii) the number of people who read exactly one newspaper.
Q.12	In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?
Q.13	In a survey of 600 students in a school, 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee? (3 marks)
Q.14	If A = {x : x is a prime number ∀ x ∈ N}, then find A^c. (1 mark)
Q.15	If X and Y are two sets such that n(X) = 17, n(Y) = 23 and n(XUY) = 38, find n(X∩Y).
Q.16	From the sets given below, select equal sets : A={2,4,8,12}, B={1,2,3,4}, C={4,8,12,14}, D={3,1,4,2}, E={-1,1}, F={0,a}, G={1,-1}, H={0,1}.

Q.17	Draw appropriate Venn diagram for each of the following: (3 marks) (i) $(A \cup B)'$ (ii) $A' \cap B'$ (iii) $(A \cap B)'$ (iv) $A' \cup B'$	
Q.18	Show that $A \cap B = A \cap C$ need not imply $B = C$. (2 marks)	
Q.19	Let U = {1,2,3,4,5,6,7,8,9,10} and A = {1,3,5,7,9}. Find A''''.	
Q.20	In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Find the number of persons who read neither. (2 marks)	

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Time: 60 min **Chapter#2 : Relations & Functions** **Full Marks:**

Q.1 Let A = {1,2} and B = {3,4}.Write A×B. How many subsets will A×B have? List them.

Q.2 Let A = {1,2,3,…..,14}. Define a relation R from A to A by R = {(x,y) : 3x-y = 0, where x,y∈A}. Write down its domain, co-domain and range.

Q.3 **If f(x) = x^2, find $\frac{f(1.2) - f(1)}{1.2 - 1}$.**

Q.4 **Find the inverse of the function of x = $\frac{3 - 5y}{2y - 7}$.**

Q.5 If n(A) = 3 and n(B) = 3, then find n(A B). (1 mark)

Q.6 Let R be a relation from Q to Q defined by
R = {(a,b):a,b∈Q and a-b∈Z}.Show that
(a) (a,a)∈R for all a∈Q
(b) (a,b)∈R implies that (b,a)∈R
(c) (a,b)∈R and (b,c)∈R implies that (a,c)∈R.

Q.7 Let A = {9, 10, 11, 12, 13} and let f: A → N be defined by f(n) = the highest prime factor of n. Find the range of f. (3 marks)

Q.8 **Find the domain of the function f(x) = $\frac{x^2 + 2x + 1}{x^2 - 8x + 12}$**

Q.9 Let A = {1, 2, 3, 4} and B = {10, 12, 13, 14, 20}. Whether f: A B defined by f(1) = 10, f(2) = 12, f(3) = 13 is a function? (1 mark)

Q.10 Find the domain and the range of the real function f defined by f (x) = |x – 1|. (2 marks)

Q.11 Examine the relation : R={(2,1),(3,1),(4,1)} and state whether it is a function or not?

Q.12 A function f is defined by f(x) = 3x-4. Write down the value of f(5) and f(-7).

Q.13 **Write the domain of the function f(x) = $\frac{x + 1}{x^2 + 6x + 5}$.**

Q.14 Let A = {1, 2, 6, 8} and let R be a relation on A defined by {(a, b): a, b A, b is exactly divisible by a} (2 marks)
a) Write R in roster form.
b) Find the domain of R.
c) Find the range of R.

Q.15 If f and g are two functions such that f(x) = 5x + 2 and g(x) = x^2 + 3, then find f + g and f – g. (2 marks)

Q.16 **Write the domain of the function ,** $f(x) = \frac{x^2 - 2x + 3}{x^2 - x - 20}$

Q.17 A function f is defined by f(x) = 2x – 5. Write down the values of (2 marks)

(i) f(0), (ii) f(7), (iii) f(–3)

Q.18 **If f(x) = $x^2 - \frac{1}{x^2}$, then find the value of : $f(x) + f\left(\frac{1}{x}\right)$.**

Q.19 Under which condition a relation f from A to B is said to be a function? (1 mark)

Q.20 If A = {a_1,a_2} and B = {b_1,b_2,b_3}, then write A × B.

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Time: 60 min **Chapter#3 : Trigonometric Functions** **Full Marks:**

Q.1	**If tan A = $\sqrt{3}$, then what is tan 2A?**
Q.2	Solve : $2\cos^2 x + 3\sin x = 0$
Q.3	Evaluate : sin(40°+θ)cos(10°+θ) - cos(40°+θ)sin(10°+θ)
Q.4	Prove that cot x cot 2x – cot 2x cot 3x – cot 3x cot x = 1. (3 marks)
Q.5	Find the value of sin 150° + cos 300°.
Q.6	If in two circles, arcs of the same length subtend angles 75° and 120º at the centre, find the ratio of their radii.
Q.7	If in two circles, arcs of same length, subtend angles 120º and 150º at the centre, find the ratio of their radii. (3 marks)
Q.8	Write the value of tan 15°.
Q.9	Prove that : $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2 \frac{x+y}{2}$
Q.10	Find the value of cos 55° + cos 125° + cos 300°.
Q.11	Find the value of sin 15°.
Q.12	Prove that: (sin 3x + sin x) sin x + (cos 3x – cos x) cos x = 0. (3 marks)
Q.13	A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second? (1 mark)
Q.14	Prove that $\frac{\cos 19^\circ - \sin 19^\circ}{\cos 19^\circ + \sin 19^\circ} = \cot 74^\circ$ (3 marks)
Q.15	If cot 2A = tan(n - 2)A, then what is A?
Q.16	Solve cos 2θ – cos θ = 0 (3 marks)
Q.17	**Write the general solution of $\cos x = \frac{1}{2}$**
Q.18	Prove that $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$
Q.19	Prove that $\cos^2 A + \cos^2 B - 2\cos A \cos B \cos(A+B) = \sin^2(A+B)$
Q.20	**Find the principal solutions of the equation tan x = $\sqrt{3}$.**

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Time: 60 min **Chapter#4 : Principle of Mathematical Induction** **Full Marks:**

Q.1	Let P (n) be the statement n(n + 1) is an even number then find P(6). (1 mark)
Q.2	Prove the following by using the principle of mathematical induction for all $n \in N$: (5 marks) $1.3+2.3^2+3.3^3+...+n.3^n=\frac{(2n-1)3^{n+1}+3}{4}$
Q.3	Prove the following by using the principle of mathematical induction for all $n \in N$: (5 marks) $1+\frac{1}{(1+2)}+\frac{1}{(1+2+3)}+...+\frac{1}{(1+2+3+...n)}=\frac{2n}{(n+1)}$
Q.4	Prove by using the principle of mathematical induction $3^{2n}-1$ is divisible by 8 for n ∈ N. (3 marks)
Q.5	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $1+3+3^2+...+3^{n-1}=\frac{(3^n-1)}{2}$
Q.6	Prove by using the principle of mathematical induction for all n∈N. $1.3+3.5+5.7+ .... +(2n-1)(2n+1)=\frac{n(4n^2+6n-1)}{3}$
Q.7	Prove by using the principle of mathematical induction for all nεN: $1+3+3^2+ .... +3^{n-1}=\frac{3^n-1}{2}$
Q.8	Prove that the product of two consecutive natural numbers is an even number. (3 marks)
Q.9	Prove the following by using the principle of mathematical induction for all n ∈ N. (3 marks) $(2n+7) < (n+3)^2$
Q.10	Use the principle of mathematical induction to prove that 1+5+9+13+ ..…………………..+(4n-3) = n(2n-1), n∈N
Q.11	Prove that : $2.7^n + 3.5^n - 5$ is divisible by 24 for all n∈N.
Q.12	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)...\left(1+\frac{(2n+1)}{n^2}\right)=(n+1)^2$
Q.13	Prove by using the principle of mathematical induction $3^n < 4^n$ for all n ∈ N. (3 marks)
Q.14	For every positive integer n, prove that $7^n - 3^n$ is divisible by 4.
Q.15	prove by using the principle of mathematical induction for n∈N : $(2n+7) < (n+3)^2$

Q.16	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+...+\frac{1}{2^n}=1-\frac{1}{2^n}$$	
Q.17	Suppose P(n): n(n+1)(n+2) is divisible by 6. Show that P(1), P(2) and P(3) are true. (1 mark)	
Q.18	Let P(n) be the statement $n^2 > 25$, prove that whenever P(k) is true, P(k + 1) is also true. (2 marks)	
Q.19	Let *P*(*n*) be the statement "$n^2 - n + 41$is prime". Show that *P*(1), *P*(2), *P*(3) are true whereas *P*(41) is not true. (2 marks)	
Q.20	Explain the principle of mathematical induction. (1 mark)	

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Time: 60 min **Chapter#5. Complex Numbers and Quadratic Equations** **Full Marks:**

Q.1 Solve the equation $2x^2 + x + 1 = 0$. (2 marks)

Q.2 **Evaluate :** $\left[i^{18} + \left(\frac{1}{i}\right)^{25} \right]$

Q.3 Convert the given complex number in polar form: –3. (3 marks)

Q.4 Express the given complex number in the form $a + ib$: $(1 – i) – (–1 + i6)$. (1 mark)

Q.5 **Express** $\left(-\sqrt{3} + \sqrt{-2}\right)\left(2\sqrt{3} - i\right)$ **in the form a+ib.**

Q.6 Evaluate: $\left(-\sqrt{-1}\right)^{4n+3}$. (1 mark)

Q.7 Express the given complex number in the form $a + ib$: $\left(\frac{1}{3} + 3i\right)^3$. (3 marks)

Q.8 Find the multiplicative inverse of the complex number $\sqrt{5} + 3i$. (2 marks)

Q.9 Express the given complex number in the form $a + ib$: $(1 – i)^4$. (2 marks)

Q.10 Find the multiplicative inverse of the complex number –i. (1 mark)

Q.11 If $x – iy = \sqrt{\frac{a - ib}{c - id}}$, then prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$. (5 marks)

Q.12 **Convert the complex number** $z = \frac{i - 1}{\cos\frac{\pi}{3} + i \sin\frac{\pi}{3}}$ **in the polar form**

Q.13 Solve : $x^2 + 2 = 0$

Q.14 Solve $4x^2 – 25i^2 = 0$. (1 mark)

Q.15 Find the argument of $1 + \sqrt{3}\,i$. (1 mark)

Q.16 **Express** $\left[\left(\frac{1}{3} + i\frac{7}{3}\right) + \left(4 + i\frac{1}{3}\right)\right]$ **in the form a+bi.**

Q.17 Express $i^9 + i^{10} + i^{11} + i^{12}$ in the form a + bi.

Q.18 Express : $i^9 + i^{19}$ in the form a+bi.

Q.19 Solve the quadratic equation $25x^2 – 30x + 11 = 0$. (2 marks)

Q.20 Write the conjugate of complex number -5 + 3i. (1 mark)

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Time: 60 min | **Chapter#6. Linear Inequalities** | **Full Marks:**

Q.1	Solve the inequality and show the graph of the solution on number line: $3(1 - x) < 2(x + 4)$. (3 marks)
Q.2	IQ of a person is given by the formula $IQ = \frac{MA}{CA} \times 100$. Where MA is mental age and CA is chronological age. If $80 \le IQ \le 140$ for a group of 12 years old children, find the range of their mental age. (3 marks)
Q.3	In a game, a person wins if he gets the sum greater than 20 in four throws of a die. In three throws he got numbers 6, 5, 4. What should be his forth throw, so that he wins the game. (3 marks)
Q.4	Solve the inequality $-3 \le 4 - \frac{7x}{2} \le 18$. (2 marks)
Q.5	A solution is to be kept between 68°F and 77°F. What is the range in temperature in degree Celsius (C) if the Celsius/Fahrenheit (F) conversion formula is given by $f = \frac{9}{8}C + 32$? (3 marks)
Q.6	Solve 7x + 9 30. (1 mark)
Q.7	Solve the inequality $7 \le \frac{(3x + 11)}{2} \le 11$. (2 marks)
Q.8	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% acid content? (5 marks)
Q.9	Solve $4x + 3 < 6x + 7$. (1 mark)
Q.10	Solve $7x + 3 < 5x + 9$. Show the graph of the solutions on number line. (2 marks)
Q.11	Solve the system of inequalities : $3x - 7 < 5 + x$ $11 - 5x \le 1$ and represent the solution on the number line.
Q.12	Solve the following system of inequalities graphically: $x + y \ge 4$, $2x - y > 0$. (3 marks)
Q.13	Solve the following system of inequalities graphically: $x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, $x \ge 0$, $y \ge 0$. (5 marks)
Q.14	Solve the following system of inequalities graphically: $2x - y > 1$, $x - 2y < -1$. (3 marks)
Q.15	To receive Grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in first four examinations are 87, 92, 94 and 95, find minimum marks that Sunita must obtain in fifth examination to get grade 'A' in the course. (3 marks)
Q.16	A shopkeeper sells a product at a price four times more than its actual price. Find the actual price such that the shopkeeper gets a benefit of at least Rs 40. (2 marks)
Q.17	The longest side of the rectangle is five times the shortest side. If the perimeter of the rectangle is atleast 120 cm. Find the minimum value of shortest side. (3 marks)
Q.18	A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added? (5 marks)
Q.19	Solve the following system of inequalities graphically: $4x + 3y \le 60$, $y \ge 2x$, $x \ge 3$, $x, y \ge 0$. (5 marks)
Q.20	Solve the inequalities and represent the solution graphically on number line: $5x + 1 > -24$, $5x - 1 < 24$. (2 marks)

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Time: 60 min **Chapter#7. Permutations and Combinations** **Full Marks:**

Q.1	If ${}^{n}C_7 = {}^{n}C_4$, find the value of n. (1 mark)
Q.2	**If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, find x.**
Q.3	Out of 3 books on economics, 4 books on political science and 5 books on Geography, how many collections can be made if each collection consist of exactly one book on each subject? (2 marks)
Q.4	How many numbers greater than 1000000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4,?
Q.5	Find the value of n such that ${}^{n}P_5 = 42\,{}^{n}P_3$, $n > 4$. (3 marks)
Q.6	How many 3-digit numbers can be formed from the digit 1, 2, 3, 4 and 5 assuming that (i) repetition of the digit is allowed? (ii) repetition of the digits is not allowed? (2 marks)
Q.7	In an examination, a question paper consists of 12 questions divided into parts, i.e. Part I and Part II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?
Q.8	How many 4-digit numbers are there with no digit repeated?
Q.9	A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one boy and one girl?
Q.10	How many 3-digit even numbers can be made using the digits 1, 2, 3, 4, 5, 6, if no digit is repeated? (2 marks)
Q.11	What is number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (3 marks) (i) four cards are of the same suits, (ii) are face cards.
Q.12	How many words with or without meaning each of 3 vowels and 2 consonants can be formed from the letters of the word *INVOLUTE?* (3 marks)
Q.13	Eighteen guests have to be seated, half on each side of a long table. Four particular guests desire to sit on one particular side and three others on the other on side. Determine the number of ways in which the sitting arrangement can be made. (3 marks)
Q.14	In how many of the distinct permutations of the letters in MISSISSIPPI do the four 1's not come together?
Q.15	Find the number of different 8-letters arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together, (ii) all vowels do not occur together.
Q.16	If ${}^{n}C_2 - {}^{n}C_1 = 35$, then find the value of n.
Q.17	In a class there are 27 boys and 15 girls. The teacher wants to select a boys and a girl for the monitor ship of the class. In how many ways can the teacher make this selection? (1 mark)
Q.18	A person has got 15 acquaintances of whom 10 are relatives. In how many ways he may invite 9 guests so that 7 of them would be relatives? (2 marks)
Q.19	A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?
Q.20	A box contains 7 red 6 white and 4 blue balls. How many selection of three balls can be made so that all three are red balls? (1 mark)

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Time: 60 min | **Chapter#8. Binomial Theorem** | **Full Marks:**

Q.1	Find the middle term in the expansion of $\left(x-\frac{1}{6y}\right)^{10}$. (2 marks)
Q.2	If a and b are distinct integers, prove that a – b is a factor of $a^n - b^n$, whenever n is a positive integer. (3 marks)
Q.3	Write the general term in the expansion of $(x^2 - y)^6$. (2 marks)
Q.4	The sum of first two terms of a G.P. is -1/64 and the sum of first three terms is 6/34. What is the seventh term?
Q.5	In the expansion of $(1 + x)^{34}$, the coefficients of (2r+1)th and (r +2)th terms are equal, find r. (3 marks)
Q.6	Find the coefficient of a^4 in the product $(1+2a)^4.(2-a)^5$, using binomial theorem.
Q.7	Find the value of $\left(a^2+\sqrt{a^2-1}\right)^4+\left(a^2-\sqrt{a^2-1}\right)^4$
Q.8	Find an approximation of $(0.99)^5$ using the first three terms of its expansion.
Q.9	Find the expansion of $(3x^2 - 2ax + 3a^2)^3$ using binomial theorem. (5 marks)
Q.10	In the expansion of $(1+a)^{m+n}$, prove that coefficients of a^m and a^n are equal.
Q.11	Find the coefficient of x^5y^7 in the expansion of $(x + 2y)^{12}$. (3 marks)
Q.12	Find the general term in the expansion of $\left(5x^2-\frac{1}{6x}\right)^{11}$. (1 mark)
Q.13	Find the number of terms in the expansion of $[(x + y)^3(x - y)^3]^2$. (1 mark)
Q.14	Find the rth term from the end in the expansion of $(x+a)^n$.
Q.15	If the coefficients of T_r, T_{r+1}, T_{r+2} terms of $(1 + x)^{14}$ are in arithmetic progression, then find the value of r. (5 marks)
Q.16	If the coefficients of 7^{th} and 13^{th} terms in the expansion of $(1 + x)^n$ are equal then find the value of n. (1 mark)
Q.17	If the ratio of the coefficients of 3rd and 4th terms in the expansion of $\left(x-\frac{1}{2x}\right)^n$ is 1:2 then find the value of n. (3 marks)
Q.18	The coefficients of three consecutive terms in the expansion of $(1+a)^n$are in the ratio 1:7:42. Find n.
Q.19	Prove that $\sum_{r=0}^{n} 3^r \, {}^nC_r = 4^n$. (2 marks)
Q.20	Show that the coefficients of the middle term in the expansion of $(1+x)^{2n}$ is equal to the sum of the coefficients of two middle terms in the expansion of $(1+x)^{2n-1}$.

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Time: 60 min **Chapter#9. Sequences and Series** **Full Marks:**

Q.1	Insert 6 numbers between – 6 and 29 such that the resulting sequence is an A.P. (3 marks)
Q.2	Find the sum of the series : 3 + 8 + 13 + ... + 33
Q.3	Find the sum of odd integer from 1 to 21.
Q.4	Find the sum to n terms of the A.P., whose k^{th} term is 5k + 1. (3 marks)
Q.5	If $A_1, A_2, A_3, \ldots, A_n$ are n arithmetic means between a and b. Find the common difference between the terms. (2 marks)
Q.6	If the sum of n terms of an A.P. is $2mn + pn^2$, where m and p are constants, find the common difference. (3 marks)
Q.7	The ratio of the sums of m and n terms of an A.P. is $m^2: n^2$. Show that the ratio of m^{th} and n^{th} term is (2m – 1): (2n – 1). (3 marks)
Q.8	Find the sum to n terms of the A.P., whose k^{th} term is 5k + 1. (3 marks)
Q.9	Show that the sequence $n^2 - 3$ is not an A.P. (1 mark)
Q.10	Find the sum to n terms of the series 1 × 2 + 2 × 3 + 3 × 4 + 4 × 5 + … (3 marks)
Q.11	What is the value of : $1^2+2^2+3^2+$ ....$+8^2$?
Q.12	Find the sum of the series : 2 + 6 + 18 + ... + 486
Q.13	Find the value of n so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be the geometric mean between a and b. (3 marks)
Q.14	What is the 20th term of the sequence, defined by $a_n = (n-1)(2-n)(3+n)$?
Q.15	Write the 16^{th} term of the sequence defined by $a_n = n^2 - n+1$. (1 mark)
Q.16	**Find the value of n so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be the geometric mean between a and b.**
Q.17	The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2^{nd} hour, 4^{th} hour and n^{th} hour? (3 marks)
Q.18	If the p^{th}, q^{th} and r^{th} terms of a G.P. are a, b and c, respectively. Prove that a^{q-r}, b^{r-p} and c^{p-q} = 1. (3 marks)
Q.19	If the fourth term of a G.P. is 3. Find the product of first 7 terms. (3 marks)
Q.20	Find the arithmetic mean of 6 and 12. (1 mark)

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Time: 60 min **Chapter#10. Straight Lines** **Full Marks:**

Q.1	The length L (in centimetre) of a copper rod is a linear function of its Celsius temperature C. In an experiment, if L = 124.942 when C = 20 and L = 125.134 when C = 110, express L in terms of C. (3 marks)
Q.2	Write the equation of a line parallel to x-axis and passing through (-2,3).
Q.3	Point R (h, k) divides a line segment between the axes in the ratio 1:2. Find equation of the line. (5 marks)
Q.4	Find the equation of the straight lien which makes an angle of 60° with the x - axis and cuts of an intercept -2 from the y - axis.
Q.5	Find the equation of the straight line joining the points (a,b) and {(a+b),(a-b)}.
Q.6	Find the slope of a line which passes through (1,2) and (-3,4)? (1 mark)
Q.7	Find the coordinates of point C, which divides the line segment joining the points D (-2, 5) and E (4, 6) in the ratio 2 : 3. (2 marks)
Q.8	If three lines whose equations are $y = m_1x + c_1$, $y = m_2x + c_2$, $y = m_3x + c_3$ are concurrent, then show that $m_1(c_2 – c_3) + m_2(c_3 – c_1) + m_3(c_1 – c_2) = 0$. (5 marks)
Q.9	Find the equation of a line which is equidistant from the lines x = - 4 and x = 8. (1 mark)
Q.10	The vertices of ΔPQR are P (2, 1), Q (–2, 3) and R (4, 5). Find equation of the median through the vertex R. (3 marks)
Q.11	Find the value of p so that the three lines 3x + y - 2 = 0, px + 2y - 3 = 0 and 2x - y - 3 = 0 may intersect at one point. (3 marks)
Q.12	Reduce 4x – 3y -12 = 0 to the ‘intercept form". (2 marks)
Q.13	Find the equation of the line perpendicular to the line 2x – 3y + 7 = 0 and having x-intercept 4. (3 marks)
Q.14	By using the concept of equation of a line, prove that the three points (3, 0), (–2, –2) and (8, 2) are collinear. (3 marks)
Q.15	Find the equation of the right bisector of the line segment joining the points (3, 4) and (–1, 2). (3 marks)
Q.16	Find the equation of the straight line passing through (2, 3) and cutting off intercepts equal in magnitude and opposite in sign. (2 marks)
Q.17	Prove that the product of the lengths of the perpendiculars drawn from the points $\left(\sqrt{a^2 - b^2}, 0\right)$ and $\left(-\sqrt{a^2 - b^2}, 0\right)$ to the line $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ is b^2. (5 marks)
Q.18	Find equation of the line perpendicular to the line x – 7y + 5 = 0 and having x intercept 3. (3 marks)
Q.19	A line passes through (x_1, y_1) and (h, k). If slope of the line is m, show that $k - y_1 = m(h – x_1)$. (2 marks)
Q.20	Write the equation of a line passing through (2,3) and makes an angle of 45° with x-axis.

XI Maths Worksheet

Time: 60 min | **Chapter#11. Conic Sections** | **Full Marks:**

Q.1	Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$. (3 marks)
Q.2	If a parabolic reflector is 20 cm in diameter and 5 cm deep, find the focus. (3 marks)
Q.3	Find the equation of the parabola with vertex (0,0), passing through the point (4,5) and symmetric about the x - axis. (2 marks)
Q.4	Find the equation of the circle which passes though the points (3,7), (5,5) and has its centre on the line x - 4y = 1. (5 marks)
Q.5	Find the equation of the circle which passes through the points (2, –2), and (3, 4) and whose centre lies on the line $x + y = 2$. (3 marks)
Q.6	Examine whether the points (2,3) lies inside, outside or on the circle $x^2 + y^2 + 2x + 2y - 7 = 0$. (2 marks)
Q.7	Find the equation of the hyperbola satisfying the give conditions: Vertices (0, ±3), foci (0, ±5). (2 marks)
Q.8	Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse $\frac{x^2}{25}+\frac{y^2}{100}=1$. (3 marks)
Q.9	Find the centre and radius of the circle : $x^2 + y^2 - 8x + 10y - 12 = 0$
Q.10	Find the equation of the hyperbola satisfying the give conditions: Foci (±4, 0), the latus rectum is of length 12. (3 marks)
Q.11	Find the equation of the circle with centre (–a, –b) and radius $\sqrt{a^2 - b^2}$. (2 marks)
Q.12	Find the equation of a circle with centre (2, 2) and passes through the point (4, 5). (3 marks)
Q.13	An equilateral triangle is inscribed in the parabola $y^2 = 4ax$, where one vertex is at the vertex of the parabola. Find the length of the side of the triangle. (5 marks)
Q.14	Find the equation of the parabola that satisfies the following conditions: Vertex (0, 0) passing through (2, 3) and axis is along x-axis. (3 marks)
Q.15	Find the radius of the circle $x^2 + y^2 - 4x + 2y + 1 = 0$. (1 mark)
Q.16	Find the equation of the ellipse that satisfies given conditions:Vertices (±6, 0), foci (±4, 0). (3 marks)
Q.17	Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point (2,3).
Q.18	Find the equation of the circle with centre at (-3, 2) and radius 4. (1 mark)
Q.19	Find the equation for the ellipse that satisfies the given conditions: Major axis on the x-axis and passes through the points (4, 3) and (6, 2). (3 marks)
Q.20	Find the equation of the parabola with focus (5, 0) and directrix $x = -5$. (2 marks)

XI Maths Worksheet

Time: 60 min **Chapter#12. Introduction to Three Dimensional Geometry** **Full Marks:**

Q.1 Using section formula, prove that the three points (– 2, 3, 5), (1, 2, 3) and (7, 0, –1) are collinear. (3 marks)

Q.2 A point is on the x-axis. What is its y-coordinate and z-coordinate? (1 mark)

Q.3 Write the coordinates of the mid-point of the line segment joining two points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$. (1 mark)

Q.4 Find the equation of set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points (1, 2, 3) and (1, 0, 0), respectively. (3 marks)

Q.5 Prove that the points P(1, 2, 3), Q(–1, –1, –1) and R(3, 5, 7) are collinear. (2 marks)

Q.6 Find the coordinates of the point which divides externally the line segment joining the points (1, –2, 3) and (3, 4, –5) in the ratio 2 : 3. (1 mark)

Q.7 Find the image of (–2,3,4) in the yz- plane. (1 mark)

Q.8 Three vertices of a parallelogram ABCD are A(4, 0, 3), B (3, 4, – 2) and C (– 2, 0, 1). Find the coordinates of the fourth vertex. (3 marks)

Q.9 Find the point in XY-plane which is equidistant from three points A(2,0,3), B(0,3,2) and C(0,0,1). (3 marks)

Q.10 Name the octants in which the following points lie: (2, 3, 4), (1, –2, 6). (1 mark)

Q.11 Find the ratio in which the line joining the points (1, 2, 3) and (- 3, 4, - 5) is divided by the xy-plane. Also, find the coordinates of the point of division. (3 marks)

Q.12 A point P is at a distance of 6 units from the origin on the Z axis. Write the coordinates of P. (1 mark)

Q.13 Find centroid of a triangle, mid-points of whose sides are (1, 2, - 3), (2, 0, 1) and (- 1, 1, - 4). (5 marks)

Q.14 Find lengths of the medians of the triangle with vertices A (0, 0, 6), B (0, 4, 0) and (6, 0, 0). (5 marks)

Q.15 Find the ratio in which the YZ-plane divides the line segment formed by joining the points (-2,4,7) and (3,-5,8).

Q.16 Given that P (3, 2, –4), Q (5, 4, –6) and R (9, 8, –10) are collinear. Find the ratio in which Q divides PR. (2 marks)

Q.17 Write the coordinates of the centroid of triangle, whose vertices are $P(x_1, y_1, z_1)$, $Q(x_2, y_2, z_2)$ and $R (x_3, y_3, z_3)$. (1 mark)

Q.18 Are the points A(3, 6, 9), B(10, 20, 30) and C(25, -41, 5) the vertices of a right angles triangle? (3 marks)

Q.19 Find the distance between the points P(1, 0, 4) and Q (– 4, 1, 0). (1 mark)

Q.20 Find the locus of the point which is equidistant from the points A(0,2,3) and B(2,–2,1). (3 marks)

XI Maths Worksheet

Time: 60 min **Chapter#13. Limits and Derivatives** **Full Marks:**

Q.1 Find the derivative of (x + sec x) (x - tanx). (2 marks)

Q.2 Find the derivative of the following function : $x^4 (5 \sin x - 3 \cos x)$. (3 marks)

Q.3 Find the derivative of $(x^2 + 1) \cos x$. (3 marks)

Q.4 Evaluate the given limit: $\lim_{x \to 0} \frac{ax + x \cos x}{b \sin x}$. (3 marks)

Q.5 **Find the derivative of** $\frac{\sin x + \cos x}{\sin x - \cos x}$.

Q.6 Evaluate the Given limit: $\lim_{x \to 0} \frac{3x^2 - x - 10}{x^2 - 4}$. (3 marks)

Q.7 Evaluate the given limit: $\lim_{x \to 1} \frac{ax^2 + bx + c}{cx^2 + bx + a}, a + b + c \neq 0$. (1 mark)

Q.8 Find the value of the limit $\lim_{x \to 3} \frac{x^2 + 10}{x - 2}$. (1 mark)

Q.9 Find the value of $\lim_{x \to 0} \frac{e^x - 1}{10x}$. (1 mark)

Q.10 Find the first derivative of x^3 - 4 at $x = 2$. (1 mark)

Q.11 Evaluate the given limit: $\lim_{x \to 0} \frac{ax + b}{cx + 1}$. (1 mark)

Q.12 Find the derivative of $x^2 \sin x$. (1 mark)

Q.13 Find the value of $\lim_{x \to 0} \frac{2 \log(1 + x)}{3x}$. (2 marks)

Q.14 Find the derivative of the following function $\frac{x^2 \cos\left(\frac{\pi}{4}\right)}{\sin x}$. (3 marks)

Q.15 Find the derivative of $x^2 + \sin x + \frac{1}{x^2}$. (2 marks)

Q.16 Suppose $f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax & x > 1 \end{cases}$ and if $\lim_{x \to 1} f(x) = f(1)$ what are possible values of a and b? (5 marks)

Q.17 For some constants a and b, find the derivative of $(ax + b)^2$. (2 marks)

Q.18 Evaluate $\lim_{x \to 0} \frac{\tan 4x}{x \sec x}$. (2 marks)

Q.19 Find the derivative of cos x from first principle. (3 marks)

Q.20 **Evaluate:** $\lim_{x \to 0} (\operatorname{cosec} x - \cot x)$.

XI Maths Worksheet

Time: 30 min **Chapter#14. Mathematical Reasoning** **Full Marks:**

Q.1 Using the words "necessary and sufficient" rewrite the statement "The integer n is odd if and only if n^2 is odd". Also check whether the statement is true.

Q.2 For the given statement identify the necessary and sufficient conditions :
If you drive over 80 km per hour, then you will get a fine.

Q.3 Write the converse of the following statements :

(i) If a number n is even, then n^2 is even.
(ii) If you do all the exercises in the book, you get an A grade in the class.
(iii) If two integers a and b are such that a > b, then a- b is always a positive integer.

Q.4 Write the negation of the following statements :
(i) p : For every real number x, $x^2 > x$.
(ii) q : There exist a rational number x such that $x^2 = 2$.
(iii) r : All students study mathematics at the elementary level.

Q.5 Find the component statements of the following compound statements and check whether they are true or false.

(i) Number 3 is prime or it is odd.
(ii) All integers are positive or negative.
(iii) 100 is divisible by 3, 11 and 5.

Q.6 Identify the quantifier in the following statements and write the negation of the statements.

(i) There exists a number which is equal to its square.
(ii) For every real number x,x is less than x+1.
(iii) There exists a capital for every state in India.

Q.7 Check whether the following statement is true or not.
If $x, y \in Z$ are such that x and y are odd, then xy is odd.

XI Maths Worksheet

Time: 60 min **Chapter#15. Statistics** **Full Marks:**

Q.1 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 are omitted. (5 marks)

Q.2 Variance of 48 data is 37.45, find its standard deviation. (1 mark)

Q.3 Find the mean deviation about the mean for the following data

Marks Obtained	0-10	10-20	20-30	30-40	40-50	0-60
Number of students	6	8	14	16	4	2

Q.4 From the data given below state which group is more variable, A or B? (5 marks)

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Group A	9	17	32	33	40	10	9
Group B	10	20	30	25	43	15	7

Q.5 The mean and standard deviation of marks obtained by 50 students of a class in three subjects, Mathematics, Physics and Chemistry are given below:

Subject	Mathematics	Physics	Chemistry
Mean	42	32	40.9
Standard deviation	12	15	20

Which of the three subjects shows the highest variability in marks and which shows the lowest? (3 marks)

Q.6 Find the mean and variance for the data 6, 7, 10, 12, 13, 4, 8, 12. (3 marks)

Q.7 Find the mean deviation about the mean for the data (5 marks)

x_i	10	30	50	70	90
f_i	4	24	28	16	8

Q.8 Find the mean deviation about the mean for the data (3 marks)

4, 7, 8, 9, 10, 12, 13, 17

Q.9 Define coefficient of variation. (1 mark)

Q.10 What is range of the following data?
45, 2, 78, 42, 22, 56, 9, 14.

Q.11 Find the mean and variance for the data (5 marks)

xi	6	10	14	18	24	28	30
f i	2	4	7	12	8	4	3

Q.12 An analysis of monthly wages paid to workers in two firms A and B, belonging to the same industry, gives the following results:

	Firm A	Firm B
No. of wage earners	586	648
Mean of monthly wages	Rs 5253	Rs 5253
Variance of the distribution of wages	100	121

(i) Which firm A or B pays larger amount as monthly wages?

(ii) Which firm, A or B, shows greater variability in individual wages? (5 marks)

Q.13 The mean and standard deviation of six observations are 8 and 4, respectively. If each observation is multiplied by 3, find the new mean and new standard deviation of the resulting observations. (5 marks)

Q.14 What are the various measures of dispersion? (1 mark)

Q.15 Find the mean deviation about the median for the data. (5 marks)

13, 17, 16, 14, 11, 13, 10, 16, 11, 18, 12, 17

XI Maths Worksheet

Time: 60 min **Chapter#16. Probability** **Full Marks:**

Q.1 A coin is tossed and a die is thrown. Find the probability that the outcome will be a head and a number greater than 4. (2 marks)

Q.2 In a class of 60 students, 32 like Maths, 30 like Biology and 24 like both Maths and Biology. If one of these students is selected at random, find the probability that the selected student (3 marks)

(a) likes Maths or Biology
(b) likes neither Maths nor Biology
(c) likes Maths but not Biology.

Q.3 A fair coin with 1 marked on one face and 4 on the other and a fair die are both tossed, write the sample of the experiment.

Q.4 Give an example of a sure event and an impossible event. (1 mark)

Q.5 A box contains 10 red marbles, 20 blue marbles and 30 green marbles, 5 marbles are drawn from the box, what is the probability that
(i) all will be blue?
(ii) at least one will be green?

Q.6 A die is thrown, find the probability of the following events :

(i) A prime number will appear.
(ii) A number less than 6 will appear.
(iii) A number greater than or equal to 3 will appear.

Q.7 Three coins are tossed. Describe :
(i) two events which are mutually exclusive.
(ii) three events which are mutually exclusive and exhaustive.

Q.8 If $\frac{2}{11}$ is the probability of an event, what is the probability of the event 'not A'. (2 marks)

Q.9 Four cards are drawn at random from a pack of 52 playing cards. Find the probability of getting: (5 marks)

(a) all the four cards of the same suit.
(b) two red cards and two black cards.
(c) all cards of the same color.
(d) one card from each suit.

Q.10 The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English examination is 0.75, what is probability of passing the Hindi examination?

Q.11 Two dice are thrown and the sum of the numbers which come up on the dice is noted. Let us consider the following events associated with this experiment

A : ‘the sum is even’
B : ‘the sum is multiple of 3’
C : ‘the sum is less than 4’
D : ‘the sum is greater than 11’

Which pairs of these events are mutually exclusive?

Q.12 One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be (2 marks)
(i) a diamond (ii) not an ace.

Q.13 Three dice are thrown simultaneously. Find the probability that: (5 marks)

(a) all of them show the same face.
(b) all show different faces.
(c) two of them show the same face.

Q.14 A bag contains 5 white and 3 black balls. Four balls are successively drawn out without replacement. What is the probability that they are alternatively of different colours? (2 marks)

Q.15 Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that

(i) both Anil and Ashima will not qualify the examination
(ii) at least one of them will not qualify the examination, and
(iii) only one of them will qualify the examination.

Q.16 Tickets are numbered from 1 to 25. They are well shuffled and a ticket drawn at random . What is the probability that the drawn ticket has a prime number?

Q.17 The probability that a person visiting a doctor will have his blood test done is 0.75 and the probabilitythat he will be admitted is 0.30. The probability that he will have his blood test done or be admitted is 0.45. Find the probability that a person visiting the doctor will have his blood test done and be admitted? (3 marks)

Q.18 Find the probability that in a random arrangement of the word ‘society’ all the three vowels come together. (3 marks)

Q.19 In a lottery, a person choses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game?
[Hint : Order of the numbers is not important]

Q.20 Find the probability that a leap year selected at random will contain 53 Mondays.
(3 marks)
