**Model Question Paper**
**Mathematics (2024-25**
**Class 10+1**

Time: 3Hrs MM:80

Special Instructions:-

1. This Question Paper contains 4 sections A, B, C & D. Each section is compulsory.
2. Sections A has (13) MCQ's and (3) Assertion Reason based questions of 1 marks each.
3. Section B has (12) Very Short answer questions of (3) marks each i.e . Q.17 to 28.
4. Sections C has (2) short answer questions of (4) marks each i,e. Q.29 to 30.
5. Sections D has (4) Long answer questions of (5) marks each i.e. Q.31 to 34.

Note: - Question no and 23, 28 and 33 are application based questions.

## Section A

Q1. If A = {a,e,i,o,u} , B = {a,b,c} , then AUB is:
a) {a,e,i,o,u} b) {a,b,c,e,i,o,u} c) {a,b,c} d){ a,e,i,o,u ,a.b.c}

Q2. A collection of most dangerous animals of the world is:
a) a null set b) a finite set c) a singleton set d) Not a set

Q3. Let A= {1,2} B = {3,4} , then the number of relations from A to B is:
a) 2 b) $2^2$ c) $2^3$ d) $2^4$

Q4. $\cos(\frac{\pi}{2} + x)$ is equal to:
a) Sin x b) Cos x c) –Sin x d) None of these

Q5. The radian measure of $520^0$ is:
a) $\frac{25\pi}{9}$ b) $\frac{26\pi}{9}$ c) $\frac{13\pi}{9}$ d) $\frac{24\pi}{9}$

Q6. Complex conjugate of 3i - 4 is:
a) - 3i – 4 b) 3i+4 c) - 3i + 4 d) None of these

Q7. If n = 5 and r = 3, then the value of ${}^{n}p_r$
a) 20 b) 30 c) 50 d) 60

Q8. A person has two parents, 4 grandparents, 8 great grandparents, and so on. Find the number of his ancestors during the ten generations preceding his own.
a) 2042 b) 2044 c) 2046 d) 2048

Q9. 1st three terms of the sequence $a_n$= 2n +5 is:
a) 6, 8, 10 b) 5,7,9 c) 0, 2, 4 d) 7, 9, 11

Q10. The equation of a line in the intercept form is:
a) $\frac{x}{a} + \frac{y}{b} = 1$ b) $\frac{x}{a} + \frac{y}{b} = ab$ c) ax + by = c d) None of these

Q11. The vertex of the parabola $y^2 = 4ax$ is :
a) (4,0) b) (- 4, 0) c) (0,4) d) (0,0)

Q12. The Value of $\lim_{x \to 0} \left(\frac{Sin\, x}{x}\right)$ is:
a) 0 b)-1 c) -2 d) 1

Q13. The derivative of $\sin^2 x$, w.r.t. x is
a) cos 2x b) $-\cos^2 x$ c) $-\sin^2 x$ d) Sin 2x

Assertion Reason Based Questions:

In the following Questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following from Q14-Q16.

Q14. Assertion (A): The radius of a circle in which a central angle of 60 degrees intercepts of an arc length 37.4cm (using $\pi = \frac{22}{7}$)

Reason (R): The formula to calculate the length of an are is l = Q x r, where l is the arc length, Q is the central angle is radians, and r is the radius of the circle.

Options:

a) Both Assertion (A) and Reason(R) are correct, and Reason (R) is the Correct explanation of Assertion (A).

b) Both Assertions (A) and Reason (R) are correct, but Reason (R) is not the correct explanation of Assertion (A).

c) Assertion (A) is correct, but Reason (R) is incorrect.

d) Assertion (A) is incorrect, but Reason (R) is correct.

Q15. Assertion (A): The derivative of the function $f(x) = x^2$ w. r. t. x is 2x.

Reason (R): The derivative of a power function $x^n$ is given by the formula $\frac{d}{dx}(x^n) = nx^{n-1}$.

options:

a) Both Assertion (A) and Reason (R) are correct, and Reason (R) is the correct explanation of Assertions(A).

b) Both Assertion (A) and Reason (R) are correct, but Reason (R) is not the Correct explanation of Assertion(A).

c) Assertion (A) is correct, but Reason(R) is in correct.

d) Assertion (A) is incorrect, but Reason (R) is correct.

Q16. Assertion (A): When a die is thrown, the event of getting a number greater than 7 is an impossible event.

Reason (R): A standard die has six faces, numbered from 1 to 6.

options:

a) Both Assertion (A) and Reason (R) is the correct explanations of Assertion (A)

b) Both Assertion (A) and Reason (R) are correct, but Reason (R) is not the correct explanation of Assertion (A)

c) Assertion (A) is incorrect, but Reason (R) is correct

d) Assertion (A) is correct, but Reason(R) is incorrect.

## Section-B

Q17. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9}
A = {2, 4, 6, 8} and B = {2, 3, 5, 7} Verify that $(A \cup B)' = A' \cap B'$

Q18. If $f(x) = x^2$, find $\frac{f(1.1) - f(1)}{(1.1-1)}$

Q19. Prove that $\frac{Sin\, x - Sin\, y}{Cos\, x + Cos\, Y} = \tan \frac{x-y}{2}$

Q20. Find the multiplicative inverse of $\sqrt{5} + 3i$

OR

Express the given complex number in the form of a + ib

$$\left(\frac{1}{3} + 3i\right)^3$$

Q21. Solve the given inequality for real x

$$\frac{3(x-2)}{5} \leq \frac{5\,(2-x)}{3}$$

OR

Solve the given inequalities and represent the solution graphically on number line

$2(x - 1) < x + 5$ , $3(x + 2) > 2 - x$

Q22. How many 3-digit even numbers can be formed from the digits, 1, 2, 3, 4, 5, 6 if the digits can be repeated?

Q23. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.

Q24. The $4^{th}$ term of a G.P. is square of its second term, and the $1^{st}$ term is -3. Determine its 7th terms.

Q25. Show that the points (-2,3,5), (1,2,3) and (7,0,-1) are collinear

OR

Verify that (0,7,10), (-1,6,6) and (-4,9,6) are the vertices of a right angled triangle.

Q26. For some constants a and b, find the derivative of $\frac{x-a}{x-b}$

Q27. If $\frac{2}{11}$ is the probability of an event, what is the probability of the event 'not A'?

Q28. John is conducting an experiment by tossing 3 fair coins simultaneously.
1) what is the probability that all three coins will land on heads?
2) What is the probability that all three Coins will land on tails?

OR

If E and F are event such that, $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$ Find
i) P (E or F)
ii) P (not E and not F)

**Section-C**

Q29. Using Binomial Theorem, Evaluate : $(102)^5$

OR

Evaluate $(\sqrt{3}+\sqrt{2})^6 - (\sqrt{3}-\sqrt{2})^6$

Q30. Find the equation of the right bisector of the line segment joining the points (3,4) and (1,2).

OR

The vertices of ΔPQR are P(2,1), Q (-2,3) and R (4,5). Find equation of the median through the vertex R.

**Section-D**

Q31. Find the values of other five trigonometric functions, if cos x = $-\frac{1}{2}$, x lies in the third quadrant.

Q32. The sum of 1st three terms of a G.P. is 16 and the sum of the next three terms is 128. Determine the 1st term, the common ratio and sum to n terms of the G.P.

OR

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.

Q33. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of latus rectum, if $y^2=12x$

OR

Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and length of latus rectum of the ellipse. $\frac{x^2}{36}+\frac{x^2}{16}=1$

Q34. Calculate mean, variance and standared deviation for the following distribution.

| Classes | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|
| Frequency | 3 | 7 | 12 | 15 | 8 | 3 | 2 |

## Chapter wise distribution of Marks

| | | |
|---|---|---|
| Chapter-1 | Sets | (1+1+3=5) |
| Chapter-2 | Relations & Functions | (1+3=4) |
| Chapter-3 | Trigonometric Functions | (1+1+1+3+5=11) |
| Chapter-4 | Complex Numbers & Quadratic Equations | (1+3(c)=4) |
| Chapter-5 | Linear Inequalities | (3(c)) |
| Chapter-6 | Permutations and Combinations | (1+3+3=7) |
| Chapter-7 | Binomial Theorem | (4(c)) |
| Chapter-8 | Sequence & Series | (1+1+3+5(c)=10) |
| Chapter-9 | Straight Lines | (1+4(c)=5) |
| Chapter-10 | Conic Sections | (1+5(c)=6) |
| Chapter-11 | Introduction to Three Dimensional Geometry | (3(c)) |
| Chapter-12 | Limits and Derivative | (1+1+1+3=6) |
| Chapter-13 | Statistics | (5) |
| Chapter-14 | Probability | (1+3+3(c)=7) |

## Blue Print

| **Name of Chapter** | **1 Marks** | **3 Marks** | **4 Marks** | **5 Marks** | **Total** |
|---|---|---|---|---|---|
| Sets | 02 | 01 | - | - | 05 |
| Relations & Functions | 01 | 01 | - | - | 04 |
| Trigonometric Functions | 03 | 01 | - | 01 | 11 |
| Complex Numbers & Quadratic Equations | 01 | 01 | - | - | 04 |
| Linear Inequalities | - | 01 | - | - | 03 |
| Permutations and Combinations | 01 | 02 | - | - | 07 |
| Binomial Theorem | - | - | 01 | - | 04 |
| Sequence & Series | 02 | 01 | - | 01 | 10 |
| Straight Lines | 01 | - | 01 | - | 05 |
| Conic Sections | 01 | - | - | 01 | 06 |
| Introduction to Three Dimensional Geometry | - | 01 | - | - | 03 |
| Limits and Derivative | 03 | 01 | - | - | 06 |
| Statistics | - | - | - | 01 | 05 |
| Probability | 01 | 02 | - | - | 07 |
| **Total** | **16** | **12** | **02** | **04** | **80** |