GRADE: 7

SUBJECT: Algebraic Expressions

Instructions:

1. The time given at the head of this Paper is the time allowed for writing the answers.
2. You will not be allowed to write during the first 10 minutes. Use this time to read the question paper carefully.
3. Attempt **all questions from Section A** and **any four questions from Section B**.
4. All working, including rough work, must be clearly shown.
5. Omission of essential working will result in loss of marks.

SECTION A (4 × 10 = 40 marks)

(Answer all questions)

1. Choose the correct option:

a) An algebraic expression consists of:
- (i) Constants and variables
- (ii) Only numbers
- (iii) Only variables
- (iv) None of the above

b) The degree of the polynomial $5x^3 - 2x^2 + 7$ is:
- (i) 1
- (ii) 2
- (iii) 3
- (iv) 5

c) The number of terms in the expression $4xy + 5y - 3$ is:
- (i) 1
- (ii) 2
- (iii) 3
- (iv) 4

d) The product of two monomials is always a:
- (i) Binomial
- (ii) Monomial
- (iii) Polynomial
- (iv) None of the above

2. Solve the following:

a) Define an algebraic expression with an example.

b) Identify the terms and their coefficients in the expression $7x^2y - 5xy + 3$

c) Write the degree of the following polynomials:

- $3x^4 - 2x^2 + 5$
- $7y^3 + 4y^2 - 9y + 6$

3. Solve the following equations:

a) Add the expressions:

- $3x^2 - 4x + 7$ and $5x^2 + 6x - 2.$

b) Subtract $(2x^2 + 3x - 5)$ from $(7x^2 - 4x + 9)$.

c) Find the value of $3x^2 - 5x + 7$ when x = 2.

4. State whether the following statements are TRUE or FALSE:

a) A binomial has exactly two terms.
b) The sum of two monomials is always a monomial.
c) The degree of a constant term is zero.
d) The subtraction of two algebraic expressions always results in a monomial.

5. Solve the following problems:

a) Expand the following expressions using the distributive property:

- $2(x + 3) + 5(x - 2)$

b) If P = $3x^2 + 4x - 7$ and Q = $x^2 - 2x + 5$, find P + Q and P - Q .

c) Identify monomials, binomials, and trinomials from the following expressions:

- $3x^2 - 7$, $x + 2y$, $5xy - 4x + 7$

SECTION B (4 × 10 = 40 marks)

(Answer any four questions)

6. Expression Formation:

a) Write an algebraic expression for the following statements:

- The sum of three times a number and 7.
- The difference between the square of a number and five times the number.

b) Convert the following word expressions into algebraic expressions:

- Twice the sum of a number and four.
- The product of three and the sum of a number and two.

7. Operations on Algebraic Expressions:

a) Multiply the expressions:

- $(x + 3)(x - 2)$
- $(2x + 5)(x + 4)$

b) Divide the polynomial $6x^3 + 9x^2$ by $3x$.

c) Find the value of $5x^2 - 3x + 2$ when x = -1 .

8. Real-Life Application Problems:

a) The perimeter of a rectangle is given by $P = 2(l + w)$. If $l = 3x + 4$ and $w = x + 2$, express the perimeter in simplified form.

b) A shopkeeper uses the expression 2x + 5y to represent the total cost of some items. If x = 3 and y = 2 , find the total cost.

c) The area of a triangle is given by A = $\frac{1}{2} \times b \times h$. If $b = 4x + 3$ and h = 2x , express the area in simplified form.

9. Higher Order Thinking Skills (HOTS):

a) The sum of two algebraic expressions is $3x^2 + 5x - 4$. If one of the expressions is $x^2 - 2x + 1$, find the other expression.

b) A polynomial $P(x)$ satisfies $P(3) = 0$. Find the unknown coefficient in $P(x) = x^2 - 2x + k$.

c) The product of two binomials is given as $(x + a)(x + b)$. If the result is $x^2 + 7x + 10$, find the values of a and b .

10. Bonus Challenge Questions:

a) A car travels $4x + 3$ km in the first hour and $5x - 2$ km in the second hour. Express the total distance covered in simplified form.

b) A square garden has a side length represented by $x + 3$. Find the expression for its area.

c) A company's profit is represented by $5x^2 - 3x + 8$ and its expenses are $2x^2 - x + 4$. Find the net profit.

END OF THE QUESTION PAPER