EDUCATION DEPARTMENT, VILLUPURAM DISTRICT.

Class : X | **UNIT TEST** | Marks: 50

Subject: **Mathematics** | **UNIT 3 - Algebra** | Time: 1½ hrs.

I. Choose the correct answer. **7×1=7**

1. If $(x-6)$ is the HCF of $x^2-2x-24$ and x^2-kx-6 then the value of k is

a) 3 b) 5 c) 6 d) 8

2. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ **is**

a) $\frac{9y}{7}$ b) $\frac{9y^3}{(21y-21)}$ c) $\frac{21y^2-42y+21}{3y^3}$ d) $\frac{7(y^2-2y+1)}{y^2}$

3. $y^2+\frac{1}{y^2}$ **is not equal to**

a) $\frac{y^4+1}{y^2}$ b) $\left(y+\frac{1}{y}\right)^2$ c) $\left(y-\frac{1}{y}\right)^2+2$ d) $\left(y+\frac{1}{y}\right)^2-2$

4. Which of the following should be added to make x^4+64 a perfect square

a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$

5. The values of a and b if $4x^4-24x^3+76x^2+ax+b$ is a perfect square are

a) 100, 120 b) 10, 12 c) –120, 100 d) 12, 10

6. Graph of a linear equation is a _____.

a) straight line b) circle c) parabola d) hyperbola

7. Find the matrix X if $2X+\begin{pmatrix}1&3\\5&7\end{pmatrix}=\begin{pmatrix}5&7\\9&5\end{pmatrix}$

a) $\begin{pmatrix}-2&-2\\2&-1\end{pmatrix}$ b) $\begin{pmatrix}2&2\\2&-1\end{pmatrix}$ c) $\begin{pmatrix}1&2\\2&2\end{pmatrix}$ d) $\begin{pmatrix}2&1\\2&2\end{pmatrix}$

II Answer the following questions. (any 5) **5×2=10**

1. Find the LCM of the given polynomials p^2-3p+2, p^2-4
2. Find the excluded values, if any of the following expressions.

   $\frac{t}{t^2-5t+6}$
3. Simplify: $\frac{x^3}{x-y}+\frac{y^3}{y-x}$
4. Find the square root of the following expressions

   $256(x-a)^8(x-b)^4(x-c)^{16}(x-d)^{20}$
5. Find the sum and product of the roots for each of the following quadratic equations

   $x^2+3x-28=0$

6. If the difference between the roots of the equation $x^2 - 13x + k = 0$ is 17 find k.

7. Verify that $A^2 = I$ when $A = \begin{pmatrix} 5 & -4 \\ 6 & -5 \end{pmatrix}$

III. Answer the following questions. (any 5) 5×5=25

1. Vani, her father and her grand father have an average age of 53. One-half of her grand father's age plus one-third of her father's age plus one fourth of Vani's age is 65. Four years ago if Vani's grandfather was four times as old as Vani then how old are they all now?

2. Simplify: $\frac{1}{x^2-5x+6} + \frac{1}{x^2-3x+2} - \frac{1}{x^2-8x+15}$

3. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of a and b.

4. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.

5. If one root of the equation $2y^2 - ay + 64 = 0$ is twice the other then find the values of a.

6. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3abc$

7. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ show that $(AB)^T = B^T A^T$

IV. Answer the following question. 1×8=8

1. a) A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

(i) Graph the above data and identify the type of variation.

(ii) From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?

(iii) If the work has to be completed by 30 days, how many workers are required?

(OR)

b) Draw the graph of $xy = 24$, x, $y > 0$. Using the graph find,

(i) y when $x = 3$ and (ii) x when $y = 6$.

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