

SECTION - A

- I. Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer 14 x 1 = 14

1. $A = \{a, b, p\}$ $B = \{2, 3\}$ $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 (A) 8 (B) 20 (C) 12 (D) 16
2. If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
 (A) $(2, -2)$ (B) $(5, 1)$ (C) $(2, 3)$ (D) $(3, -2)$
3. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B , then the number of elements in B is
 (A) 3 (B) 2 (C) 4 (D) 8
4. Euclid's division lemma states that for positive integers a and b , there exist unique integers q and r such that $a = bq + r$, where r must satisfy.
 (A) $1 < r < b$ (B) $0 < r < b$ (C) $0 \leq r < b$ (D) $0 < r \leq b$
5. The sum of the exponents of the prime factors in the prime factorization of 1729 is
 (A) 1 (B) 2 (C) 3 (D) 4
6. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is
 (A) 0 (B) 6 (C) 7 (D) 13
7. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
 (A) 3 (B) 5 (C) 8 (D) 11
8. A system of three linear equations in three variables is inconsistent if their planes
 (A) Intersect only at a point (B) Intersect in a line
 (C) Coincides with each other (D) Do not intersect
9. Graph of a linear equation is a _____
 (A) Straight line (B) Circle (C) Parabola (D) Hyperbola
10. The solution of $(2x - 1)^2 = 9$ is equal to
 (A) -1 (B) 2 (C) -1, 2 (D) None of these
11. The square root of $\frac{256 x^8 y^4 z^{10}}{25 x^6 y^6 z^6}$ is equal to
 (A) $\frac{16}{5} \left| \frac{x^2 z^4}{y^2} \right|$ (B) $16 \left| \frac{y^2}{x^2 z^4} \right|$ (C) $\frac{16}{5} \left| \frac{y}{xz^2} \right|$ (D) $\frac{16}{5} \left| \frac{xz^2}{y} \right|$
12. 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

13. 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) $-8x^2$
14. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is
 (A) 0 (B) 1 (C) 0 or 1 (D) 2

SECTION - B

10 x 2 = 20

II. Answer any 10 question. Question No 28 is compulsory

15. If $A \times B = \{(3, 2) (3, 4) (5, 2) (5, 4)\}$ then find A and B.
16. Let $A = \{1, 2, 3\}$ and $B = \{x \mid x \text{ is a prime number less than } 10\}$. Find $A \times B$ and $B \times A$.
17. A Relation R is given by the set $\{(x, y) \mid y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.
18. Prove that the product of two consecutive positive integers is divisible by 2.
19. Find the first four terms of the sequences whose nth term is $a_n = (-1)^{n+1} n(n+1)$
20. Which term of an A.P. 16, 11, 6, 1, ... is -54?
21. Find the LCM of $p^2 - 3p + 2$, $p^2 - 4$
22. Reduce the rational expression to its lowest form $\frac{x^2 - 11x + 18}{x^2 - 4x + 4}$
23. Find the excluded value of $\frac{t}{t^2 - 5t + 6}$
24. Simplify $\frac{x^3 - y^3}{3x^2 + 9xy + 6y^2} \times \frac{x^2 + 2xy + y^2}{x^2 - y^2}$
25. Simplify $\frac{x^3}{x-y} + \frac{y^3}{y-x}$
26. Find the square root of $\frac{121(a+b)^8 (x+y)^8 (b-c)^8}{81(b-c)^4 (a-b)^{12} (b-c)^4}$
27. Solve the quadratic equation by formula method $2x^2 - 5x + 2 = 0$
28. Find the sum and product of the roots for $2x^2 + 5x + 7 = 0$

(OR)

Determine the nature of roots for $9x^2 - 24x + 16 = 0$

III. Answer any 10 question. Question No 42 is compulsory

29. Let $A = \{x \in \mathbb{N} \mid 1 < x < 4\}$, $B = \{x \in \mathbb{W} \mid 0 \leq x < 2\}$ and $C = \{x \in \mathbb{N} \mid x < 3\}$. Then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.
30. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible. $\{(x, y) \mid y = x + 3, x, y \text{ are natural numbers } < 10\}$
31. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of 10224 and 9648
32. The sum of three consecutive terms that are in A.P. is 27 and their product is 288.
33. Solve $x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$
34. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$
35. Find the LCM of the following polynomials
 $a^2 + 4a - 12$, $a^2 - 5a + 6$ whose GCD is $a - 2$.
36. Simplify $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$
37. If $A = \frac{2x+1}{2x-1}$, $B = \frac{2x-1}{2x+1}$ Find $\frac{1}{A-B} - \frac{2B}{A^2 - B^2}$
38. Find the square root of $37x^2 - 28x^3 + 4x^4 + 42x + 9$
39. 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.
40. If the roots of $(a - b)x^2 + (b - c)x + (c - a) = 0$ are real and equal, then prove that b, a, c are in arithmetic progression
41. The roots of the equation $x^2 + 6x - 4 = 0$ are α, β . Find the quadratic equation whose roots are (i) α^2 and β^2 (ii) $\frac{2}{\alpha}$ and $\frac{2}{\beta}$
42. Let $A =$ The set of all natural numbers less than 8, $B =$ The set of all prime numbers less than 8, $C =$ The set of even prime number. Verify that $A \times (B - C) = (A \times B) - (A \times C)$

(OR)

If $36x^4 - 60x^3 + 61x^2 - mx + n$ is a perfect square, find the m and n

SECTION - D

2 x 8 = 16

IV. Answer the following

43. (i) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR (scale factor $\frac{3}{5} < 1$)

OR

- (ii) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC (scale factor $\frac{6}{5} > 1$).

44. (i) Discuss the nature of the solution of $x^2 + x - 12 = 0$

OR

- (ii) Discuss the nature of the solution of $x^2 - 4x + 4 = 0$