

VINAYAGA TUITION CENTRE
FIRST MID TERM TEST-2022
MATHEMATICS

CLASS: 10

TIME: 1.30Hrs

MARKS: 50

I. Choose the best answers

7 x 1 = 7

1. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of element in B is a)3 b)2 c)4 d)8
2. If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively a)(8,6) b)(8,8) c)(6,8) d)(6,6)
3. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$ then $f \circ g$
 - a) $\frac{3}{2x^2}$
 - b) $\frac{2}{3x^2}$
 - c) $\frac{2}{9x^2}$
 - d) $\frac{1}{6x^2}$
4. $F(x) = (x+1)^3 - (x-1)^3$ represents a function which is
 - a) linear
 - b) cubic
 - c) reciprocal
 - d) quadratic
5. $7^{4k} \equiv (\text{mod } 100)$ a)1 b)2 c)3 d)4
6. In an A.P., the first term is 1 and the common difference is 4. how many terms of the A.P. must be taken for their sum to be equal to 120
 - a)6
 - b)7
 - c)8
 - d)9
7. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1+2+3+\dots+15)$ is
 - a)14400
 - b)14200
 - c)14280
 - d)14520

II. Answer the following any 10 questions

10 x 2 = 20

11. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B.
12. Let $A = \{1, 2, 3\}$ and $B = \{x \mid x \text{ is a prime number less than } 10\}$.
Find $A \times B$ and $B \times A$.
13. A plane is flying at a speed of 500 km per hour. Express the distance 'd' travelled by the plane as function of time t in hours.
14. Let f be a function from \mathbb{R} to \mathbb{R} define by, $f(x) = 3x - 5$. Find the values of a and b given that (a, 4) and (1, b) belong to f.
15. Show that the function $f : \mathbb{N} \rightarrow \mathbb{N}$ defined $f(x) = 2x - 1$ is one - one but not onto.
16. Represent the function $f(x) = \sqrt{2x^2 - 5x + 3}$ as a composition of two functions.
17. Show that the square of an odd integer is of the form $4q + 1$, for some integer q.
18. Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case.
19. Find the least number that is divisible by the first ten natural numbers.
20. Find the number of terms in the A.P. 3, 6, 9, 12, ,111.
21. In G.P. the 9th term is 32805 and 6th term is 1215. Find the 12th term.
22. Find the value of $16 + 17 + 18 + \dots + 75$.

III. Answer the following any 3 question**3 x 5= 15**

23. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide Rs. 10,000, Rs. 25,000, Rs.50, 000, and Rs. 1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. A_1, A_2, A_3, A_4 and A_5 were Assistants; C_1, C_2, C_3, C_4 were Clerks; M_1, M_2, M_3 were managers and $E_1, E_2,$ were Executive officers and if the relation R is defined by xRy , where x is the salary given to person y, express the relation R through an ordered pair and an arrow diagram.
24. Let $f : A \rightarrow B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where $A = \{2, 4, 6, 10, 12\}$, $B = \{0, 1, 2, 4, 5, 9\}$. Represent f by (i) set of ordered pairs (ii) a table (iii) an arrow diagram (iv) a graph
25. Find x if $gff(x) = fgg(x)$, given $f(x) = 3x + 1$ and $g(x) = x + 3$.
26. Find the HCF of 396, 504, 636.
27. If l^{th}, m^{th} and n^{th} terms of an A.P. are x, y, z respectively, then show that (i) $x(m - n) + y(n - l) + z(l - m) = 0$ (ii) $(x - y)n + (y - z)l + (z - x)m = 0$.
28. The product of three consecutive terms of a G.P. is 343 and their sum is $\frac{91}{3}$. Find the three terms.

IV. Answer the following question**1 x 8= 8**

29. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3} > 1$)

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