Plk brilliants

RELATIONS AND FUNCTIONS
UNIT TEST

CLASS: 10 **MARKS:50**
SUB: MATHS **TIME: 1.30 Hrs.**

I. Choose the correct answer: 7 x 1 = 7

1. If n(AXB) = 6 and A = {1,3} then n(B) is
(A) 1 (B) 2 (C) 3 (D) 6

2. If A = {a,b,p}, B = {2,3}, C = {p,qr,s} then n[(A ∪ B) × C] is
(A) 8 (B) 20 (C) 12 (D) 16

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. 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)

5. Let n(A) = m and n(B) = n then the total number of non-empty relations that can be defined from A to B is
(A) m^n (B) n^m (C) 2^{mn}-1 (D) 2^{mn}.

6. If f: A → B is a bijective function and if n(B) =7, then n(A) is
(A) 7 (B) 49 (C) 1 (D) 14

7. If g = {(1,1), (2,3), (3,5), (4,7)} is a function given by g(x) = αx + β then the values of α and β are (A) (-1,2) (B) (2,-1) (C) (-1,-2) (D) (1,2)

II. Answer any five questions: (Q.No.14 is compulsory) 7 x 2 = 14

8. Let A = {1,2,3} and B={x: x *is a prime number less than* 10}. Find AXB and BXA.

9. Let A={3,4,7,8} and B={1,7,10}. Which of the following sets are relations from A to B?
(i) R_1={(3,7),(4,7),(7,10),(8,1)} (ii) R_2 = {(3,1),(4,12)}

10. A relation R is given by the set $\{(x, y): y = x + 3, x \in \{0,1,2,3,4,5\}\}$. Determine its domain and range.

11. Given the function f: x → $x^2 - 5x + 6$, evaluate (i) f(-1) (ii) f(2a)

12. Let f be a function from $\mathbb{R} \to \mathbb{R}$ defined by f(x) = 3x-5. Find the values of a and b given that (a,4) and (1,b) belongs to f.

13. Represent the function f = {(1,2), (2,2), (3,2), (4,3), (5,4)} through (i) an arrow diagram (ii) a table form

14. Find k if $f_o f(k) = 5$ where f(k) = 2k-1

III. Answer any five questions: (Q.No.21 is compulsory) 7 x 5 = 35

15. Given A={1,2,3}, B={2,3,5}, C={3,4} and D ={1,3,5}, check if $(A \cap C)X(B \cap D) = (AXB) \cap (CXD)$ is true?

16. 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. If A_1,A_2,A_3,A_4 and A_5 were Assistants; C_1,C_2,C_3 and C_4 are 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.

17. Let A = {1,2,3,4} and B = {2,5,8,11,14} be two sets. Let f: A → B be a function given by f(x) = 3x-1. Represent this function (i) by arrow diagram (ii) in a table form (iii) as a set of ordered pairs (iv) in a graphical form.

18. Let f be a function f: ℕ → ℕ be defined by f(x) = 3x+2 x∈ℕ (i) Find the images of 1,2,3
(ii) Find the pre-images of 29, 53 (iii) Identify the type of function.

19. If the function f: $\mathbb{R} \to \mathbb{R}$ is defined by f(x) = $\begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \le x < 3 \\ 3x - 2, & x \ge 3 \end{cases}$, then find the values of (i) f(4)
(ii) f(-2) (iii) f(4) + 2 f(1) (iv) $\frac{f(1)-3f(4)}{f(-3)}$.

20. Let f(x) = x^2 - 1. Find (i) fof (ii) fofof

21. If f(x) = 2x+3, g(x) = 1-2x and h(x) = 3x. Prove that $f_o(g_oh) = (f_og)_oh$.

IV. Answer all the question: 1 x 8 = 8

22. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{2}{3} < 1$). (OR)
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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