

FSS

FIRST MID TERM TEST - 2022

10 - STD

MATHEMATICS

Time : 1.30 Hrs

Marks : 50

I Choose the correct answer.

5 X 1 = 5

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 $n(A) = p$, $n(B) = q$ then the total number of functions that exist from A to B is
a) 2^{pq} b) $2^{pq}-1$ c) p^q d) q^p
3. Give $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
a) 3 b) 5 c) 8 d) 11
4. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
a) 4 b) 2 c) 1 d) 3
5. The solution of the system $x + y - 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is
a) $x = 1, y = 2, z = 3$ b) $x = -1, y = 2, z = 3$
c) $x = -1, y = -2, z = 3$ d) $x = 1, y = -2, z = 3$

II Answer any 6 questions. Question No. 13 is compulsory. 6 X 2 = 12

6. Let $A = \{1, 2, 3\}$ and $B = \{x / x \text{ is a prime number} < 10\}$ Find $A \times B$ and $B \times A$.
7. Let $A = \{1, 2, 3, \dots, 45\}$ and R be the relation defined as "is square of a number" on A. Write R as a subset of $A \times A$. Also, find the domain and range of R.
8. Let f be a function from R to R defined by $f(x) = 3x - 5$. Find the values of a and b given that $(a, 4)$ and $(1, b)$ belongs to f.
9. Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.
10. Solve : $5x \equiv 4 \pmod{6}$
11. Find the sum : $3 + 1 + \frac{1}{3} + \dots \infty$.

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12. Find the LCM : $P^2 - 3p + 2$, $P^2 - 4$.

13. Find S_n for $\left(1 - \frac{1}{n}\right) + \left(1 - \frac{2}{n}\right) + \left(1 - \frac{3}{n}\right) + \dots$ upto n terms.

III Answer any 5 questions. Question No. 20 is compulsory. $5 \times 5 = 25$

14. Let $A = \{x \in \mathbb{N} / 1 < x < 4\}$, $B = \{x \in \mathbb{W} / 0 \leq x < 2\}$ and $C = \{x \in \mathbb{N} / x < 3\}$ then verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$.

15. If $f(x) = 2x - 1$, $g(x) = \frac{x+1}{2}$, show that $(f \circ g) = g \circ f = x$.

16. i) Find the LCM and HCF of 408 and 170 by applying the fundamental theorem of arithmetic.

ii) $a_n = \begin{cases} n(n+3); & n \in \mathbb{N} \text{ is odd} \\ n^2 + 1; & n \in \mathbb{N} \text{ is even} \end{cases}$ Find a_{11} , a_{18} .

17. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.

18. Find the sum of n terms of the series $0.4 + 0.44 + 0.444 + \dots$ upto n terms.

19. Solve the following system of linear equations.

$$x + y + z = 5; \quad 2x - y + z = 9; \quad x - 2y + 3z = 16.$$

20. Let $A = \{9, 10, 11, 12, 13, 14, 15, 16, 17\}$ and let $f : A \rightarrow \mathbb{N}$ be defined by $f(n) = n$ then highest prime factor of $(n \in A)$. Write f as a set of ordered pairs and find the range of f .

IV Answer the following question.

$$1 \times 8 = 8$$

21. Construct a triangle similar to a given ΔPQR with the sides equal to $\frac{7}{3}$ of the corresponding sides of the ΔPQR . (Scale factor $\frac{7}{3} > 1$) **(OR)**

b) Two poles of height 'a' metres and 'b' metres are 'p' metres apart. Prove that the height of the point of intersection of the lines joining the top

of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$ metres.