

**KA** **COMMON FIRST MID-TERM TEST - 2019**

Standard X **MATHEMATICS** Part - I

Time: 1.30 hours. Reg.No.: 

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 Marks: 50

**I. Choose the correct answer:** 10 X 1 = 10

- If there are 1024 relations from a set  $A = \{1,2,3,4,5\}$  to set B, then the number of elements of B is  
a) 3                      b) 2                      c) 4                      d) 8
- If  $\{(a,8), (6,b)\}$  represents an identify function, then the value of a and b are respectively  
a) (8,6)                      b) (8,8)                      c) (6,8)                      d) (6,6)
- If  $f(x) = 2x^2$  and  $g(x) = \frac{1}{3x}$ , then fog is  
a)  $\frac{3}{2x^2}$                       b)  $\frac{2}{3x^2}$                       c)  $\frac{2}{9x^2}$                       d)  $\frac{1}{6x^2}$
- Let  $f(x) = \sqrt{1+x^2}$  then  
a)  $f(xy) = f(x).f(y)$                       b)  $f(xy) \geq f(x).f(y)$   
c)  $f(xy) \leq f(x).f(y)$                       d) none of these
- Composition of functions is associative  
a) always true                      b) never true                      c) sometimes true                      d) none of these
- Euclid's division lemma states that for positive integer 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)  $0 < r \leq b$
- $7^{4k} \equiv \underline{\hspace{1cm}} \pmod{100}$   
a) 1                      b) 2                      c) 3                      d) 4
- The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P?  
a) 4551                      b) 10091                      c) 7881                      d) 13531
- 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
- The graph of any second degree polynomial gives a curve called \_\_\_\_\_.  
a) straight line                      b) co-ordinate axes                      c) parabola                      d) none of these

**Part - II**

**II. Answer any 5 questions: (Ques.No.18 is compulsory)** 5 x 2 = 10

- If  $A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$  then find A and B.
- Let f be a function  $f : \mathbb{N} \rightarrow \mathbb{N}$  be defined by  $f(x) = 3x + 2, x \in \mathbb{N}$ .  
i) Find the image of 2  
ii) Find the pre-image of 29
- Let  $A = \{1,2,3,4\}$  and  $B = \mathbb{N}$ . Let  $f : A \rightarrow B$  be defined by  $f(x) = x^3$  then,  
i) find the range of f                      ii) identify the type of function
- Let  $f(x) = x^2 - 1$ . Find fof.
- If the Highest Common Factor of 210 and 55 is expressible in the form  $55x - 325$ . Find x.
- If  $13824 = 2^a \times 3^b$ , then find a, b.

(2)

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17. Find  $x, y$  and  $z$ , given that the numbers  $x, 10, y, 24, z$  are in A.P.  
18. Find  $x$  so that  $x+6, x+12$  and  $x+15$  are consecutive terms of a Geometric Progression.

(or)

When the positive integers  $a, b$  and  $c$  are divided by 13 the respective remainders are 9, 7 and 10. Find the remainder when  $a + 2b + 3c$  is divided by 13.

Part - III

III. Answer any 5 questions: (Ques.No.26 is compulsory)

5 x 5 = 25

19. If the function
- $f: \mathbb{R} \rightarrow \mathbb{R}$
- is defined by

$$f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}, \text{ then find the values of}$$

- i)  $f(4)$                       ii)  $f(-2)$                       iii)  $f(4) + 2f(1)$                       d)  $\frac{f(1)-3f(4)}{f(-3)}$

- 20.
- $f(x) = x - 1$
- ,
- $g(x) = 3x + 1$
- and
- $h(x) = x^2$
- . Show that
- $(f \circ g) \circ h = f \circ (g \circ h)$

21. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit

(F) is defined by  $t(C) = F$  where  $\left(F = \frac{9}{5}C + 32\right)$ . Find

- i)  $t(0)$                       ii)  $t(28)$                       iii)  $t(-10)$   
iv) The value of  $C$  when  $t(c) = 212$   
v) The temperature when the Celsius value is equal to the Fahrenheit value.  
22. In an A.P, sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.  
23. The sum of first  $n, 2n$  and  $3n$  terms of an A.P are  $S_1, S_2$  and  $S_3$  respectively. Prove that  $S_3 = 3(S_2 - S_1)$   
24. Find the sum to  $n$  terms of the series  $3+33+333+\dots$   
25. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm, ....., 24 cm. How much area can be decorated with these colour papers?  
26. The distance  $S$  of an object travels under the influence of gravity in time 't' seconds is given by  $S(t) = \frac{1}{2}gt^2 + at + b$ , where  $a, b$  are constants greater than zero ( $g$  is the acceleration due to gravity). Check if the function  $S(t)$  is one-one. (or)  
Find the sum of all natural numbers between 300 and 600, which are divisible by 7.

Part - IV

IV. Answer any one of the following questions:

1 x 5 = 5

27. 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  $\frac{2}{3}$ ) (or)

Graph the quadratic equation  $x^2 + x - 12 = 0$  and state its nature of solutions.

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