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(11) $A \times B = \{(2,1), (2,-4), (-2,1), (-2,-4), (3,1), (3,-4)\}$

$A \times A = \{(2,2), (2,-2), (2,3), (-2,2), (-2,-2), (-2,3), (3,2), (3,-2), (3,3)\}$

(12) $A = \{3, 4\}$

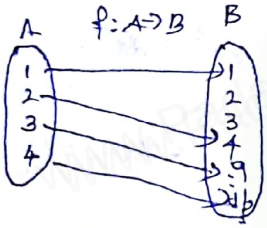
$B = \{-2, 0, 3\}$.

(13) Domain $= \{0, 1, 2, 3, 4, 5\}$

Range $= \{3, 4, 5, 6, 7, 8\}$

(14) $f(1) = 1^2 = 1$, $f(2) = 2^2 = 4$, $f(3) = 3^2 = 9$

$f(4) = 4^2 = 16$



One to one function and Into function

(15) $a = 13 \times q_1 + 9$ ①

$b = 13 \times q_2 + 7$ ②

$c = 13 \times q_3 + 10$ ③

Add on both sides

$a+b+c = 13(q_1+q_2+q_3) + 26$

$= 13(q_1+q_2+q_3) + 13 \times 2$

$= 13[q_1+q_2+q_3+2)$

Hence $a+b+c$ is divisible by 13.

(16) $8x^4y^2, 48x^2y^4$

$8 \overline{)8, 48} = 48x^4y^4$

$11\ 6$

(17) $\frac{8x^2y}{4z^2} \times \frac{3 \times 8 \times x^2}{2^2 y^2 x} = \frac{3x^3}{8y}$

Five Marks:

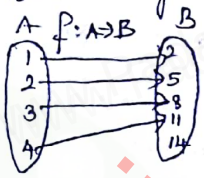
(18) $f(1) = 3(1)-1 = 2$ $f(2) = 6-1 = 5$

$f(3) = 9-1 = 8$ $f(4) = 12-1 = 11$

set of ordered pairs:-

$F = \{(1,2), (2,5), (3,8), (4,11)\}$

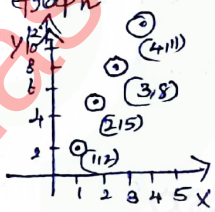
an arrow diagram



In a Table form

x	1	2	3	4
f(x)	2	5	8	11

Graph



(19) $f(-3) = 6(-3)+1$

$= -18+1 = -17$

$f(2) = 5(2)^2 - 1$

$= 5 \times 4 - 1$

$= 20 - 1 = 19$

$f(-3) + f(2) = -17 + 19 = 2$

$f(-2) = 6(-2)+1 = -12+1 = -11$

$f(6) = 3(6)-4 = 18-4 = 14$

$f(4) = 5(4)^2 - 1$

$= 5 \times 16 - 1$

$= 80 - 1 = 79$

$= \frac{2(-11) - 44}{74 - 11}$

$= \frac{-22-14}{68} = \frac{-36}{68} \left| \frac{-18}{34} \right| \frac{-9}{17}$ //

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(20) $(fog)(x) = f[g(x)] = f(3x+1) = 3x+1-1 = 3x$

$(fog)oh(x) = (fog)h(x)$

$= (fog)x^2 = 3x^2$ ①

$(goh)(x) = g[h(x)] = g(x^2) = 3x^2+1$

$fo(goh)x = f(3x^2+1) = 3x^2+1-1 = 3x^2$ ②

From ① and ② verified.

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(21) By using Euclid's division lemma

$a = bq + r$

To find HCF of 396, 504 $a > b$

$504 = 396(1) + 108$

r is $108 \neq 0$

$396 = 108(3) + 72$

r is $72 \neq 0$

$108 = 72(1) + 36$

r is $36 \neq 0$

$72 = 36(2) + 0$

remainder is 0, hence HCF = 36

Now:-

$636 = 36 \times 17 + 24$

r is $24 \neq 0$

$36 = 24 \times 1 + 12$

r is $12 \neq 0$

$24 = 12 \times 2 + 0$

remainder is 0.

Hence HCF of 396, 504, 636 is 12

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(22) $x + y + z = 5$ ... (1)

$2x - y + z = 9$ ... (2)

$3x + 2z = 14$ ... (4)

$4x - 2y + 2z = 18$ ... (3)

$x - 2y + 3z = 11$ ... (5)

$3x - z = 2$ ... (5)

Compare (4), (5)

$3x + 2z = 14$

$3x - z = 2$

$3z = 12 \quad z = 4$

Then $x = 3$, $y = -1$

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(23) $f(x) = 2x^3 - 5x^2 + 5x - 3$

$g(x) = x^3 + x^2 - x + 2$

$x^3 + x^2 - x + 2 \;\big|\; 2x^3 - 5x^2 + 5x - 3 \;\big|\; 2$

$2x^3 + 2x^2 - 2x + 4$

$- \quad - \quad + \quad -$

$-7x^2 + 7x - 7$

$r(x) = -7(x^2 - x + 1) \neq 0$

change $r(x)$ as $g(x)$, $g(x)$ as $f(x)$

$x^2 - x + 1 \;\big|\; x^3 + x^2 - x + 2 \;\big|\; x + 2$

$x^3 - x^2 + x$

$- \quad + \quad -$

$2x^2 - 2x + 2$

$2x^2 - 2x + 2$

$(-) \quad (+) \quad (-)$

0

$r(x) = 0$

Hence GCD is $(x^2 - x + 1)$

(24) Find the square root

$x^2 - 6x + 3$

x^2 | $x^4 - 12x^3 + 42x^2 - 36x + 9$

$-x^4$

$2x^2 - 6x$ | $0 - 12x^3 + 42x^2$

$-12x^3 + 36x^2$

(+) (−)

$2x^2 - 12x + 3$ | $6x^2 - 36x + 9$

$6x^2 - 36x + 9$

(−) (+) (−)

0

$= |x^2 - 6x + 3|$

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COMMON FIRST MID-TERM TEST - 2019

Standard X

MATHEMATICS

Reg.No. :

Time: 1.15 hours. Marks: 50

Part - A

I. Choose the correct answer: 10 x 1 = 10

1. If n(A x B) = 6 and A = {1,3} then n(B) is
   a) 1 b) 2 c) 3 d) 6
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. Let A = {1,2,3,4} and B = {4,8,9,10}. A function f : A→B given by f = {(1,4), (2,8), (3,9), (4,10)} is a
   a) many-one function b) identity function
   c) one-to-one function d) into function
4. 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) $\frac{1}{6x^2}$
5. If f : A→B is a bijective function and if n(B) = 7 then n(A) =
   a) 7 b) 49 c) 1 d) 14
6. 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 ≤ r < b d) 0 < r ≤ b
7. $7^{4k} \equiv$ ___ (mod 100)
   a) 1 b) 2 c) 3 d) 4
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) concides with each other d) do not intersect
9. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
   a) $\frac{9y}{7}$ b) $\frac{9y^3}{(21y-21)}$ c) $\frac{21y^2-42y+21}{3y^3}$ d) $\frac{7(y^2-2y+1)}{y^2}$
10. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to
    a) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ b) $16\left|\frac{y^2}{x^2z^4}\right|$ c) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ d) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

Part - B

II. Answer any 5 of the following questions: 5 x 2 = 10

11. Find A x B and A x A
    A = {2,-2,3} and B = {1,-4}
12. If B x A = {(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)}, find A and B.

COIMBATORE

13. 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.
14. Let A = {1,2,3,4} and B = N. Let f : A→B be defined by $f(x) = x^2$ then
    i) find the range of f ii) identify the type of function
15. When the positive integer a,b and c are divided by 13, the respective remainders are 9,7 and 10. Show that a + b + c is divisible by 13.
16. Find the LCM of the following: $8x^4y^2$, $48x^2y^4$
17. Simplify: $\frac{5x^2y}{4z^2} \times \frac{6xz^2}{20y^2}$

Part - C

III. Answer any 5 questions: 5 x 5 = 25

18. 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
19. A function f : [-5,9] → R is defined as follows:

$$f(x)=\begin{cases}6x+1 & \text{if } -5\le x<2\\ 5x^2-1 & \text{if } 2\le x<6\\ 3x-4 & \text{if } 6\le x\le 9\end{cases}$$

-5, -4, -3, -2, -1, 0, 1
2, 3, 4, 5
6, 7, 8, 9

Find i) f(-3) + f(2) ii) $\frac{2f(-2)-f(6)}{f(4)+f(-2)}$

20. Consider the functions f(x), g(x), h(x) as given below. Show that (fog)oh = fo(goh)
    f(x) = x - 1, g(x) = 3x + 1 and $h(x) = x^2$
21. Find the HCF of 396, 504, 636
22. Solve the following system of linear equations in three variables.
    x + y + z = 5; 2x - y + z = 9; x - 2y + 3z = 16
23. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.
24. Find the square root of the following polynomials by division method:
    $x^4 - 12x^3 + 42x^2 - 36x + 9$

Part - D

IV. Answer the following questions: 1 x 5 = 5

25. 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)

26. Consturct 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 $\frac{2}{3}$)

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