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SUBJECT- MATHS, LOGICAL REASONING & STATS

Test Code – CFN 9266

BRANCH - () (Date :)

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1. duplicate ratio of $\frac{x}{4} : \frac{y}{5}$ is

$\left(\frac{x}{4}\right)^2 : \left(\frac{y}{5}\right)^2 = \frac{x^2}{16} \div \frac{y^2}{25} = \frac{x^2}{16} \times \frac{25}{y^2} = \frac{25x^2}{16y^2}$

i.e $25x^2 : 16y^2$ **[Ans.: C]**

2. $\frac{A}{3} = \frac{B}{4} = \frac{C}{5} = k$ $\therefore$ A = 3k, B = 4k, C = 5k

Now, $\frac{2A+B+C}{C} = \frac{6k+4k+5k}{5k} = \frac{15k}{5k} = 3$ **[Ans.: B]**

3. $a^{1/3} + b^{1/3} + c^{1/3} = 0$

Let $x = a^{1/3}, y = b^{1/3}, z = c^{1/3}$

If $x + y + z = 0$ then

$x^3 + y^3 + z^3 = 3xyz$

$\therefore \left(a^{1/3}\right)^3 + \left(b^{1/3}\right)^3 + \left(c^{1/3}\right)^3 = 3a^{1/3} b^{1/3} c^{1/3}$

$\therefore a + b + c = 3a^{1/3} b^{1/3} c^{1/3}$

$\therefore (a + b + c)^3 = [3a^{1/3} b^{1/3} c^{1/3}]^3$

$\therefore (a + b + c)^3 = 27abc$ **[Ans.: C]**

4. $\frac{1}{\log_a(ab)} + \frac{1}{\log_b(ab)}$

$\log_{ab} a + \log_{ab} b$

$= \log_{ab}(a \cdot b) = 1$ **[Ans.: B]**

5. $\frac{8^n \times 2^3 \times (16)^{-1}}{2^n \times 4^2} = \frac{1}{4}$

$\therefore \frac{(2^3)^n \times 2^3 \times (2^4)^{-1}}{2^n \times (2^2)^2} = \frac{1}{2^2}$

$\therefore \frac{2^{3n} \times 2^3 \times 2^{-4}}{2^n \times 2^4} = 2^{-2}$

$\frac{2^{3n+3-4}}{2^{n+4}} = 2^{-2}$

$\therefore 2^{3n-1-n-4} = 2^{-2}$

$\therefore 2^{2n-5} = 2^{-2}$

$\therefore 2n - 5 = -2$

$\therefore 2n = -2 + 5$

$\therefore$ 2n = 3

$\therefore$ n = $^3/_2$ **[Ans.: B]**

6. $\frac{25\ hours}{45\ minutes} = \frac{25 \times 60\ minutes}{45\ minutes} = \frac{25 \times 60}{45}$

$= \frac{100}{3} = 100 : 3$ **[Ans.: B]**

7.

$\log_{2\sqrt{7}} 21952$	$log_{3\sqrt{3}}\ 19683$
$= \log_{\sqrt{28}}(28)^3$	$= \log_{\sqrt{27}}(27)^3$
$= \frac{\log(28)^3}{\log\sqrt{28}}$	$= \frac{\log(27)^3}{\log\sqrt{27}}$
$= \frac{3\log 28}{\frac{1}{2}\log 28} = 6$	$= \frac{3\log 27}{\frac{1}{2}\log 27} = 6$

$\therefore$ both are equal. **[Ans. : A]**

8. $\frac{a}{b} = \frac{4}{3}$ $\therefore$ a = 4k, b = 3k

$\frac{x}{y} = \frac{7}{5}$ $\therefore$ x = 7m, y = 5m

Now, $\frac{2ax-3by}{ax+by} = \frac{2(4k)(7m)-3(3k)(5m)}{4k(7m)+(3k)(5m)}$

$= \frac{56km-45km}{28km+15\ km} = \frac{11km}{43km} = \frac{11}{43}$

= 11 : 43 **[Ans.: C]**

9. $2^x \times 3^y \times 5^z = 360 = 2^3 \times 3^2 \times 5^1$

$\therefore$ $2^x \times 3^y \times 5^z = 2^3 \times 3^2 \times 5^1$

$\therefore$ x = 3, y = 2, z = 1 **[Ans.: A]**

10. $\left(\frac{2}{5}\right)^5 \div \left(\frac{2}{5}\right)^{10}$

Let $\left(\frac{2}{5}\right) = x$

$\therefore$ $x^5 \div x^{10} = \frac{x^5}{x^{10}} = \frac{1}{x^5} = \frac{1}{\left(\frac{2}{5}\right)^5} = \frac{2}{\frac{2^5}{5^5}}$

$= \frac{5^5}{2^5} = \left(\frac{5}{2}\right)^5$ **[Ans.: B]**

11. 10% of x = 20% of y

$\therefore$ 0.1 *x* = 0.2 *x*

$\therefore \frac{x}{y} = \frac{0.2}{0.1} = \frac{2}{1}$

$\therefore$ x : y = 2 : 1 **[Ans.: B]**

12. $\log_2 x + \log_4 x + \log_{16} x = \frac{21}{4}$

$\therefore \frac{log^x}{log^2} + \frac{log^x}{log^4} + \frac{log^x}{log^{16}} = \frac{21}{4}$

$\therefore \log x \left[\frac{1}{\log 2} + \frac{1}{log 2^2} + \frac{1}{\log 2^4}\right] = \frac{21}{4}$

$\therefore \log x \left[\frac{1}{\log 2} + \frac{1}{2\, log 2} + \frac{1}{4 \log 2}\right] = \frac{21}{4}$

$\therefore \frac{\log x}{\log 2}\left[1 + \frac{1}{2} + \frac{1}{4}\right] = \frac{21}{4}$

$\therefore \frac{\log x}{\log 2}\left[\frac{4+2+1}{4}\right] = \frac{21}{4}$

$\therefore \frac{\log x}{\log 2}\left(\frac{7}{4}\right) = \frac{21}{4}$

$\therefore \frac{\log x}{\log 2} = \frac{21}{4} \times \frac{4}{7}$

$\therefore \frac{\log x}{\log 2} = 3$

$\therefore log\ x = 3 \log 2$

$\therefore \log x = \log 2^3$

$\therefore x = 2^3$

$\therefore x = 8$ **[Ans.: D]**

13. Wife $\Rightarrow \frac{3}{6} \times 148200 = 74100$

Son $\Rightarrow \frac{2}{6} \times 148200 = 49400$ **[Ans.: C]**

14. $x^{2/3} = \sqrt[3]{x^2}$

$\therefore x^{2/3} = (x^2)^{1/3}$

$\therefore x^{2/3} = x^{2/3}$ **[Ans.: A]**

15. $\frac{1}{4} : \frac{1}{5} : \frac{1}{6}$ LCM of 4, 5, 6 = 60

$= \frac{60}{4} : \frac{60}{5} : \frac{60}{6} = 15 : 12 : 10$

$A = \frac{15}{37} \times 407 = 165$

B = $\frac{12}{37} \times 407 = 132$

C = $\frac{10}{37} \times 407 = 110$ **[Ans.: A]**

16. $\log_2 x = 10$ $\therefore x = 2^{10}$

$\log_x y = 100$ $\therefore y = x^{100} = (2^{10})^{100} = 2^{1000}$ **[Ans.: C]**

17. 6, 8, 5, 7 $\therefore 42 = 40$ X

$\therefore$ 6, 8, 5, 7 are not in proportion. **[Ans.: A]**

18. $a = 5^{1/3} + 5^{-1/3}$

$\therefore a^3 = [5^{1/3} + 5^{-1/3}]^3$ Identity $(x+ y)^3 = x^3 + y^3 + 3xy (x + y)$

$a^3 = (5^{1/3})^3 + (5^{-1/3})^3 + 3.\ 5^{1/3} \cdot 5^{-1/3} (5^{1/3} + 5^{-1/3})$

$a^3 = 5 + 5^{-1} + 3.\ 5^{1/3} \cdot \frac{1}{5^{1/3}} (a)$

$a^3 = 5 + \frac{1}{5} + 3a$

$\therefore a^3 - 3a = \frac{26}{5}$

$\therefore 5a^3 - 15a = 26$ **[Ans.: B]**

19. $\frac{A}{B} = \frac{8}{15}, \frac{B}{C} = \frac{5}{8}, \frac{C}{D} = \frac{4}{5}$

Now, $\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} = \frac{8}{15} \times \frac{5}{8} \times \frac{4}{5}$

$\therefore \frac{A}{D} = \frac{4}{15}$

$\therefore$ A : D = 4 : 15 **[Ans.: B]**

20. $\log \left(\frac{25}{4}\right) = \log 25 - \log 4$

[$\because \log \left(\frac{m}{n}\right) = \log m - \log n$] **[Ans.: B]**

21. If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a}{c} = \frac{b}{d}$ (Alternendo)

$\therefore \frac{2}{3} = \frac{4}{6} \Rightarrow \frac{2}{4} = \frac{3}{6}$ (alternendo) **[Ans.: D]**

22. E : S = 4 : 1

Let E = 4*x*, S = *x*

Total Income = E + S = 4*x* + *x* = 5*x*

25% of Total income = 0.25 × 5*x* = 1.25*x*

Now, new saving = 2.25x, Total income remains same = 5x

$\therefore$ new expenses = 5x – 2.25x = 2.75 x

$\therefore$ New ratio = $\frac{2.75x}{2.25x} = \frac{275}{225} = \frac{11}{9}$

i.e. 11 : 9 **[Ans.: D]**

23. $\log_{\left(\frac{1}{5}\right)} 625 = \frac{\log 625}{\log\left(\frac{1}{5}\right)} = \frac{\log 5^4}{\log 5^{-1}}$

$= \frac{4\log 5}{-1\log 5} = \frac{4}{-1} = -4$ **[Ans.: B]**

24. $x = 1 + \sqrt{2}$

$\therefore x^2 = (1 + \sqrt{2})^2$

$= 1 + 2\sqrt{2} + 2$

$x^2 = 3 + 2\sqrt{2}$

$(1 + x)(1 – x)$

$= 1 – x^2$

$= 1 – (3 + 2\sqrt{2})$

$= 1 – 3 – 2\sqrt{2}$

$= – 2 – 2\sqrt{2}$ **[Ans.: A]**

25. Let 3rd proportion = x

$\therefore$ 49, 21, x are in proportion

$\therefore (21)^2 = 49x$

$\therefore 441 = 49x$

$\therefore x = 9$ **[Ans.: C]**

26. $\frac{1}{4}\log_2 a = \frac{1}{6}\log_2 b = -\frac{1}{24}\log_2 c = k$

$\therefore \log_2 a = 4k, \log_2 b = 6k, \log_2 C = -24k$

$\therefore a = 2^{4k}, \; b = 2^{6k}, \quad c = 2^{-24k}$

Now, $a^3 \cdot b^2 \cdot c = (2^{4k})^3 \cdot (2^{6k})^2 \cdot 2^{-24k}$

$= 2^{12k} \cdot 2^{12k} \cdot 2^{-24k} = 2^{12k + 12k - 24k}$

$= 2^0 = 1$ **[Ans.: B]**

27. $[1 - \{1 - (1 - x^2)^{-1}\}^{-1}]^{-1/2}$

$= [1 - \{1 - \frac{1}{1 - x^2}\}^{-1}]^{-1/2}$

$= \left[1 - \left\{\frac{1 - x^2 - 1}{1 - x^2}\right\}^{-1}\right]^{-1/2}$

$= \left[1 - \left\{\frac{-x^2}{1 - x^2}\right\}^{-1}\right]^{-1/2}$

$= \left[1 - \left(\frac{1 - x^2}{-x^2}\right)\right]^{-1/2}$

$= \left[1 + \frac{1 - x^2}{x^2}\right]^{-1/2}$

$= \left[\frac{x^2 + 1 - x^2}{x^2}\right]^{-1/2}$

$= \left[\frac{1}{x^2}\right]^{-1/2}$

$= [x^{-2}]^{-1/2} = x$ **[Ans.: B]**

28. 4, *x*, 9, 13 ½ are in proportion

$\therefore 4 \times 13.5 = 9x$

$\therefore 54 = 9x$

$\therefore x = 6$ **[Ans.: A]**

29. $\log_6 6 = 1$ ($\because \log_a a = 1$) **[Ans.: B]**

30. $(27)^{2/3} \times \sqrt{9} \times \sqrt[3]{9^3} \times 9^{1/2}$

$= (3^3)^{2/3} \times 3 \times (9^3)^{1/3} \times 9^{1/2}$

$= 9 \times 3 \times 9 \times 9^{1/2} = 243\sqrt{9}$

None of these **[Ans.: D]**

31. G : W = 3 : 1 $\therefore$ G = 30, W = 10

Now, $\frac{30}{10 + x} = \frac{2}{1}$

$\therefore 30 = 20 + 2x$

$10 = 2x$

$\therefore x = 5$ **[Ans.: D]**

32. $p^{a-b} \cdot p^{b-c} \cdot p^{c-a} = p^{a-b+b-c+c-a}$

$= P^0 = 1$ **[Ans.: B]**

33. $\log \frac{m}{n} + \log \frac{n}{m} = \log (m + n)$

$\therefore \log \left(\frac{m}{n} \cdot \frac{n}{m}\right) = \log (m + n)$

$\therefore \log 1 = \log (m + n)$

$\therefore m + n = 1$ **[Ans.: A]**

34. $\frac{4}{9} \times \left(\frac{3}{4}\right)^2 \times \left(\frac{2}{3}\right)^3 \times \sqrt{\frac{9}{64}}$

$= \frac{4}{9} \times \frac{9}{16} \times \frac{8}{27} \times \frac{3}{8} = \frac{1}{36}$

i.e. 1 : 36 **[Ans.: C]**

35. $2^x - 2^{x-1} = 32$

$\therefore 2^x - 2^x \cdot 2^{-1} = 32$

$\therefore 2^x \left(1 - \frac{1}{2}\right) = 32$

$\therefore 2^x \left(\frac{1}{2}\right) = 32$

$\therefore 2^x = 64$

$\therefore 2^x = 2^6$

$\therefore x = 6$ **[Ans.: C]**

36. Integral part of log is characteristic and decimal part of log is Mantissa.
[Ans.: B]

37. $\log 24 = \log (8 \times 3) = \log 8 + \log 3$

$= \log 2^3 + \log 3$

$= 3 \log 2 + \log 3$

$= 3(0.3010) + 0.4771$

$= 0.9030 + 0.4771$

$= 1.3801$ **[Ans.: C]**

38. $a = 3\sqrt{\sqrt{2} + 1} - 3\sqrt{\sqrt{2} - 1}$

$\therefore a = \left(\sqrt{2} + 1\right)^{1/3} - \left(\sqrt{2} + 1\right)^{-1/3}$

$\therefore\ a = x^{1/3} - x^{-1/3}\ (x = \sqrt{2} + 1)$

$\therefore\ a^3 = (x^{1/3} - x^{-1/3})^3$

$\therefore\ a^3 = (x^{1/3})^3 - (x^{-1/3})^3 - 3x^{1/3} \cdot x^{-1/3} \cdot (x^{1/3} - x^{-1/3})$

$\therefore\ a^3 = x - x^{-1} - 3a$ $\qquad (\sqrt{2}-1)(\sqrt{2}+1)$

$\therefore\ a^3 + 3a = x - x^{-1}$ $\qquad = 2 - 1 = 1$

$\therefore\ a^3 + 3a = (\sqrt{2}+1) - (\sqrt{2}-1)$ $\qquad \therefore\ \sqrt{2}-1 = \frac{1}{\sqrt{2}+1}$

$\therefore a^3 + 3a = 2$ $\qquad \therefore\ \sqrt{2}-1 = (\sqrt{2}+1)^{-1}$

$\therefore\ a^3 + 3a - 2 = 0$ **[Ans.: B]**

39. Ratio is 3 : 4

$\therefore$ Antecedent = $3x$ & Consequent = $4x$

Here $3x = 12$ $\qquad \therefore$ Consequent = 4(4) = 16

$\therefore\ x = 4$ **[Ans.: B]**

40. $\log_2 16\sqrt{8} + \log_5 \frac{\sqrt[4]{25}}{625}$

$= \log_2 2^4 \times (2^3)^{1/2} + \log_5 \frac{(5^2)^{1/4}}{5^4}$

$= \log_2 2^4 \times 2^{3/2} + \log_5 \frac{5^{2/4}}{5^4}$

$= \log_2 2^{4+\frac{3}{2}} + \log_5 5^{\frac{1}{2}-4}$

$= \left(4 + \frac{3}{2}\right) \log_2 2 + \left(\frac{1}{2} - 4\right) \log_5 5$

$= 4 + \frac{3}{2} + \frac{1}{2} - 4 = \frac{4}{2} = 2$ **[Ans.: A]**

41. For line E_1 : Two pts. Are (0, 1) and (2, – 1)

For line E_2 : Two pts. Are (0, 1) & (– 2, – 1)

<u>By trial & error Method</u>

Two equation are x + y = 1 [E_1] and x – y = – 1 **[Ans.: C]**

42. If AB = 0 then it is not necessary that either A = 0 or B = 0 **[Ans.: C]**

43. Let present age of man = x and

Present age of son = y

Here $(x + 6) = 3(y + 6)$ $\quad \therefore x + 6 = 3y + 18$

& $(x - 3) = 9(y - 3)$ $\quad \therefore x = 3y + 12$

$\therefore x - 3 = 9y - 27$

$\therefore 3y + 12 - 3 = 9y - 27$

$\therefore 9 + 27 = 9y - 3y$

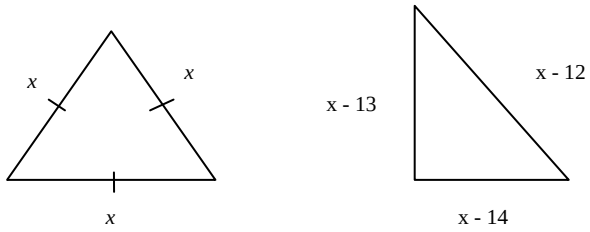
$\therefore 36 = 6y \quad \therefore y = 6$

$\therefore x = 30$ **[Ans.: B]**

44. $A^2 = A \cdot A = \begin{bmatrix}1 & 1 & 1\\ 1 & 1 & 1\\ 1 & 1 & 1\end{bmatrix}\begin{bmatrix}1 & 1 & 1\\ 1 & 1 & 1\\ 1 & 1 & 1\end{bmatrix}$

$= \begin{bmatrix}3 & 3 & 3\\ 3 & 3 & 3\\ 3 & 3 & 3\end{bmatrix} = 3A$ **[Ans.: C]**

45.



$(x - 12)^2$

$= (x - 13)^2 + (x - 14)^2$

By trial & error, $x = 17$ **[Ans.: A]**

46. Here $A = \begin{bmatrix}a & 0 & 0\\ 0 & a & 0\\ 0 & 0 & a\end{bmatrix} = a\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$

$\therefore A = aI \qquad [I^2 - I]$

$\therefore A^2 = (aI)(aI) = a^2I^2 = a^2 \cdot I$

$A^3 = A^2 \cdot A = (a^2 I) \cdot (a I) = a^3 \cdot I^2 = a^3 \cdot I$

$\therefore A^n = a^n \cdot I = a^n \begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix} = \begin{bmatrix}a^n & 0 & 0\\ 0 & a^n & 0\\ 0 & 0 & a^n\end{bmatrix}$ **[Ans.: C]**

47. Here $\alpha + \beta = \left(\frac{1}{\alpha}\right)^2 + \left(\frac{1}{\beta}\right)^2$ (given)

$\alpha + \beta = \frac{1}{\alpha^2} + \frac{1}{\beta^2}$ $\therefore \alpha + \beta = \frac{\beta^2 + \alpha^2}{\alpha^2\beta^2}$

$\therefore \alpha + \beta = \frac{\alpha^2 + \beta^2}{(\alpha\beta)^2}$ $\therefore -\frac{b}{a} = \frac{b^2 - 2ac\ /a^2}{c^2/_{a^2}}$

$\therefore -\frac{b}{a} = \frac{b^2 - 2ac}{c^2}$

$\therefore -bc^2 = ab^2 - 2a^2c$

$\therefore 2a^2c = ab^2 + bc^2$

$\therefore 2 = \frac{ab^2}{a^2c} + \frac{bc^2}{a^2c}$

$\therefore 2 = \frac{b^2}{ac} + \frac{bc}{a^2}$ $\therefore \frac{b^2}{ac} + \frac{bc}{a^2} = 2$ **[Ans.: B]**

48. Here order of A is 2×3 and order of B is 3×2

$\therefore$ AB and BA are exist but not equal because order of AB is 2×2 and order of BA is 3×3.

[Ans.: B]

49. Here, $\alpha = 2 + \sqrt{3}$

$\therefore \beta = 2 - \sqrt{3}$

Now $\alpha + \beta = 4$ and $\alpha\beta = 4 - 3 = 1$

And equation is

$x^2 - (\alpha + \beta)x + \alpha\beta = 0$

$\therefore x^2 - 4x + 1 = 0$

But equation is $x^2 + px + q = 0$

$\therefore p = -4$ and $q = 1$ **[Ans.: C]**

50. Here $x - \sqrt{x} = 12$

By trial & error method,

$x = 16$ **[Ans.: B]**